BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXX 1898. No. 2

# FROBISHER BAY REVISITED.

BY

RUSSELL W. PORTER.

The doubt in the minds of geographers as to whether Frobisher Bay was a closed arm of Davis Straits or a strait opening into a larger body of water to the northwest remained unsettled from the time it was discovered by Martin Frobisher, in 1576, until thirty-seven years ago.

Thinking that the region might possibly hold some clue to the fate of Sir John Franklin's expedition, Charles F. Hall, afterwards Commander of the United States Polar Expedition, visited Baffin Land in 1860, and the next summer entered Frobisher Bay and reached its headwaters. The original object of his expedition was a failure, but his geographical work of locating some five hundred miles of shore line and innumerable islands scattered through the bay, made the trip of permanent value.

Since that time there is no record of white men having explored this bay. Whaling vessels have wintered in Davis Straits to the north of the bay, and of late years a whaling station has been established forty miles from its entrance, but the work of these men was confined to the seaboard in the interest of catching whales.

The idea of again traversing the little-known regions was conceived by the writer in the fall of 1896, on his return from Greenland, during a short stop at a Scotch whaling station in Cumberland Sound.

It was his intention to remain in southern Baffin Land with one companion through the winter, in order to reach by dog sledges the lake region of the interior, and make an extended study of the Eskimos in this vicinity for ethnological purposes.

Provisions and equipment were therefore taken for a fifteen-

XUM

months' stay, and the writer, accompanied by Alfred V. Shaw, of Newton Highlands, Mass., embarked at Boston July 19 on the steam-whaler *Hope.* *

The *Hope* coaled at New Campbellton, Cape Breton, passed through the Gulf of St. Lawrence and up the Labrador coast. She crossed the entrance to Hudson's Straits the last day of July, and early on the morning of the 1st of August the party were landed at Cape Haven on the west coast of Baffin Land in latitude 62° 54′ N.

From Hall's account of his travels in this region, it is quite evident that the Eskimos were of inestimable service to him, both as guides and in taking advantage of the different conditions of weather, winds and tides, which here especially contribute an important factor in determining just how much territory can be covered in a given time. Twelve natives were therefore hired to accompany the party. The equipment consisted of two whaleboats, rigged with mainsails and jibs, sleeping bags, kerosene oil stoves, and canned provisions. In retrospect it must be admitted that the trip as carried out could not have been accomplished safely without these natives. The tides in the bay vary from twenty to thirty feet, and when setting in opposite directions, as they sometimes do among the islands, create currents which are remarkably erratic and powerful, so that a party new to these regions and alone would be apt to have their boat on the rocks before their journey had scarcely begun. The winds in the same way are to be equally unrelied upon, as they are dependent to a great extent on the configuration of the country for their direction. They may change, as they did several times this summer, to the four points of the compass in a single day's run. The Eskimos, thoroughly familiar with these fickle elements, enable one not only to avoid danger, but to make use of them to advantage.

After a preliminary trip to the head of Cyrus W. Field's Bay the party started on August 11 for Frobisher Bay, taking a southerly course towards Bear's Sound. This sound separates a few large outlying islands marking the northern entrance of the bay from the mainland, and is full of islands. Its easterly entrance, Lupton

* In addition to the above a party of six persons, organized by the writer and composed mostly of college students, joined the expedition for the sport which a summer in this region afforded. It need only be stated here that this party spent a very satisfactory six weeks in and about the bay, there being an abundance of game, including polar bears, reindeer, ducks, ptarmigan and sea trout. The total and remarkable absence of all floe-ice accounted for the disappearance of the walrus, which is only found in the vicinity of floating ice.

Channel, is contracted to a width of half a mile and is impassable when a rough sea from the Atlantic meets a setting-out tide from the sound, a line of breakers forming from shore to shore. Within the sound the currents are moving among the islands in all directions and with great velocity, owing to the tide entering this body at both entrances. The islands rise abruptly from the water, are rounded off and show intact signs of former glacial action. Eider ducks (*Somateria mollissima*) were seen here in great numbers, among which was found one flock of the rare King Eider (*Somateria spectabilis*).*

The first view of Frobisher Bay itself disclosed the Everett chain of mountains on the further side of the bay, which at the entrance is thirty miles broad.

It appeared as a blue line of serrated peaks between which at remarkably regular intervals large glaciers forced their way to the water's edge. Ten of these were then visible, and the eye following them back into the interior could make out the faint white dome of the ice cap outlined against the southern sky.

The course was now changed to the northwest, following up the eastern coast. The land here rises to an almost uniform height of 500 feet. The aspect of the interior from this ridge is one of extreme desolation. The rock, almost void of vegetation, is broken up by frost action to such an extent as to effectually conceal the ledge underneath with a waste of sharp angular blocks piled one upon another. Here and there against hillsides having a northerly exposure were banks of snow which had withstood the summer's heat. This snow was, more properly speaking, of the consistency of ice, the alternate thawing and freezing during summers and winters having brought it to this state. It was not ascertained whether the banks were increasing or diminishing.

The bay along this coast for twenty miles is shallow, a falling tide and a westerly wind causing a dangerous undertow and huge waves which curl and break several miles from shore. Numerous reefs also tend to make this quarter a bad one during rough weather. This area of shoal water is called by the natives "Ickarto."

In latitude 62° 45′ N. the bay indents its eastern coast to a considerable extent, forming the historic body of water known as Countess of Warwick Sound. Here in 1861 Hall found several relics of the Frobisher Expedition of 1578.

* The identity of this bird was not known until after they had become unfit for preserving as specimens. The natives had removed and eaten the lumps of fat lying on either side of the upper bill where it joins the head.

According to the manuscript accounts of this hardy mariner and some of his officers, they had intended to build a house on one of the islands of the sound and establish a colony of one hundred men, who were to mine iron ore which had been found here the year before. As part of the house had been swept overboard on the outward voyage from England, the project had to be given up. Hall found the remains of a ship's trench and some of the "proofs,"—lumps of iron which had been made by the assayers of Frobisher's Expedition. The island is called "Kodlunarn" by the Eskimos, or "White Man's Island," there being still a tradition among them of a number of ships coming from the east manned by white men.

This sound is only separated from Cyrus W. Field's Bay by two miles of land, and a pass between the mountains at this point becomes a highway in winter for natives who visit the bay from the seaboard. A perfect raised beach, the only one seen in Frobisher Bay, was discovered on one of the mountains north of the sound. It was composed of large rounded bowlders and pebbles, had an elevation of about two hundred feet and extended along the western slope of the mountain for a mile or more. Rounding the southern slope, an exact counterpart was discovered on the eastern side having the same elevation and kind of material.

Continuing up the coast, the land preserves the same general character as that found on entering the bay. The ridges near the coast remained at the usual height of 500 feet, but the view into the interior always presented the same appearance of rolling country, always rock, which rose as it receded until at the horizon the mountains might have an elevation of 1,000 feet.

The valleys always contained a stream of water taking its source from the patches of snow-ice. Vegetation thrived only at rare intervals where rock had disintegrated and formed soil, but in the larger valleys in the vicinity of water-courses, soft and spongy moss was always to be found. In these places, a species of stunted blueberry grows in considerable quantities, the berries being small and almost tasteless and maturing the last of September. Buttercups, primroses, daisies and yellow poppies were also seen in sheltered spots, forming bright bits of color which relieved the monotony of the landscape.

About half-way up the bay the first of a large number of islands which continue on up to the headwaters was reached and a circuitous course taken among them. These islands, composed of mica schist, the predominating rock of this region, contain many polished summits which bear unmistakable marks of glaciation. The general

direction of the striation found on the islands in the middle of the bay was parallel to the bay itself, viz.: northwest and southeast. Strong currents were again encountered among these islands, sometimes so strong that, notwithstanding a strong fair wind was blowing and all sail was set, the shore would have to be resorted to and camp pitched to await a turn of the tide.

Seals frequent the waters here in the winter when "water holes" are formed by the currents, making an opportunity for these animals to come to the surface to breathe. It is a favorite stamping-ground for the Eskimos in winter, who take up their abode here in order to be near the seals, from which they obtain their food, clothing and fuel.

As the headwaters of the bay are neared, the land to the east takes on a more undulating surface and rises to only a slight elevation: islands grow smaller and more numerous.

One night was spent on the end of Becher Peninsula (5th encampment) which divides the head of the bay into two large inlets. That to the east of Becher Peninsula, Hall has designated as Ward's Inlet, while the western body of water, being somewhat larger, he has considered the terminus of Frobisher Bay itself. Our course lay up this arm of the bay. Islands became mere reefs and ledges over which the tide at flood rushed with great violence.

The Sylvia Grinnell River, of Hall, was found to be a stream of considerable importance as compared to other rivers of this locality. Its entrance to the bay was choked with small islands, tide water setting back some three miles to a beautiful falls, which at high water was about fifteen feet high. This river was not traversed beyond the falls, but it could be seen for several miles flowing from the northwest in sinuous curves through a low, almost undulating valley.

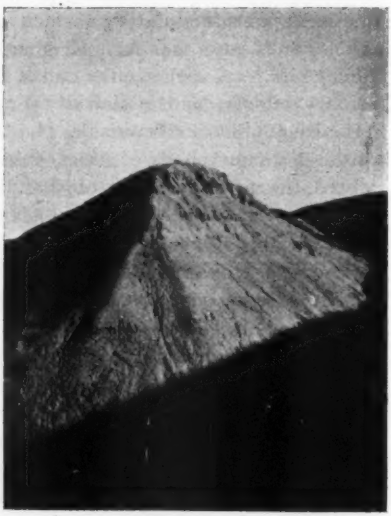
Twelve miles west of the Sylvia Grinnell River is a sister stream, the Jordan, which in its physical characteristics is a counterpart of the Grinnell. Its falls, divided by a small island, can only be reached with great difficulty at ebb tide, due to the great amount of tide water setting out into the bay over a wide, shallow, sandy bottom.*

* The two boats were five hours in making this distance, three miles. This trip against the morning tide seemed to be the only bit of bad judgment shown by the natives during the summer, but is partly explained from the fact that several of their tribesmen were encamped at the falls (their huts had been discovered through the telescope the day before), and they were anxious to meet their people, whom they had not seen since the winter previous. The boats went aground several times, and had it not turned into a veritable race for first place, for this our farthest north, the journey would have probably been given up until the afternoon.

XUM

The "Valley of the Jordan," if the size of its river is taken into account, must embrace a large watershed, probably extending well to the southwest towards Hudson's Straits. Its limit in the opposite direction is but a few miles from the river itself, as several long, narrow valleys discharging small streams into the bay were found lying between the two larger rivers. Moreover, the natives stated that Lake Amakdjuak, which drains north into Lake Nettilling and thence west into Fox Channel, was only distant "two sleeps." This expression "two sleeps" referred to journeys taken in summer by Eskimos heavily laden with their effects, and meant not more than thirty miles.

By far the most interesting feature of this valley was the Sillimans Fossil Mount of Hall. This is a limestone table-topped mountain, situated on the western side of the valley not far from tide-water, and lies close against the mountains of Meta Incognita. It forms a striking feature of the landscape, with its white sides silhouetted against the dark mica schist of the chain behind it; and when seen at a distance has the appearance of an immense sandbank extending out from the mountains. On reaching the base of the mountain the sides were found to be tali, which extended nearly to the top, and here the ledge cropped out in several places, making the plateau almost inaccessible except from the south, where it joins the ledge of the mountain side.



SILLIMANS FOSSIL MOUNT.

The view from the top is an extensive one. Jutting into the valley, as the mountain does, one commands an outlook down the bay and through the many islands until they dip to the horizon line.

Below you lies the valley through which the Jordan flows. As its course is traced northwards towards the interior, the Great

Gateway, so-called by Hall, outlines a northern sky and points the way to the great and unknown lake region.

Sillimans Fossil Mount is divided into two parts, brought about by the action of a small stream rising in the chain of hills to the west, and forcing its way out into the valley between the two high banks of crumbling limestone.

THE FOSSIL MOUNTAIN (2D VIEW).

Fossils were collected* mostly from the bed of this brook and the slopes of the smaller mount. They were also found imbedded in the outcropping ledge at the summit of the larger mount, and a few were discovered on the table top

* The writer has received a communication relating to a part of these fossils from Prof. C. Schuchert, of the National Museum at Washington, D. C. It is given here. That part of the collection made by the writer is at the American Museum of Natural History, New York City.

DEAR MR. PORTER :

The fossils collected by Messrs. J. Nilson Carpender, A. Hollis White and Alfred V. Shaw, members of your Frobisher Bay party, at Sillimans Fossil Mount, are very interesting, historically and paleontologically.

As you know the Arctic explorer Charles Francis Hall describes in his "Arctic Researches and Life among the Esquimaux" the discovery of this locality and writes of the abundance of fossils occurring there. However it seems he brought back but six species from Sillimans Fossil Mount. These were studied by R. P. Stevens and his results published in the *American Journal of Science* for 1863. These fossils appear now to be lost.

In the three collections at hand there are seventy species indicating a varied and very well preserved fauna. Of corals there are 7 species, sponges 2, brachiopods 8, mollusca 46, trilobites 6 and cystids 1. You will therefore see that the work of your party added much material to elucidate the geologic history of Baffin Land.

The age of the Baffin Land fossils is Trenton, or the middle part of the Lower Silurian system, and find their nearest relatives in the Galena fauna of Iowa and Minnesota.

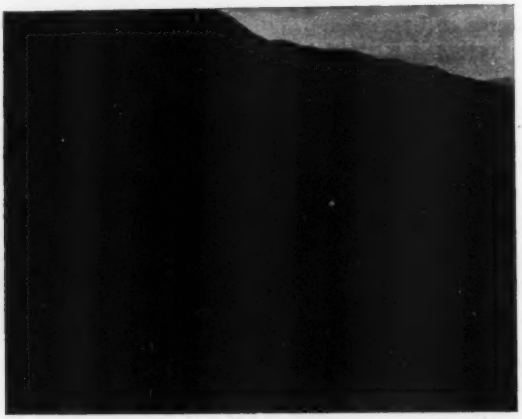
The same fauna is also found in Manitoba, but is not so abundantly represented by individuals and species.

Mr. E. M. Kindle, of the Sixth Peary Greenland Expedition, also obtained fos-

XUM

itself, which is covered with a thin layer of moss and strewn with granite bowlders of glacial deposit. The height of this fossil formation is 340 feet above high water, instead of 100 feet as given by Hall.

It may be said before leaving this interesting locality that the



SILLIMAN MOUNT.

falls of the Jordan River contain quantities of sea trout,* which are secured by the natives with fish spears.

A native will take his position on the edge of the rocks, just below the falls, in swift water. With spear poised aloft, his eyes glued to the surface of the boiling stream, he awaits the clearing of the water of air bubbles so that he can see the bottom.

At such a time long parallel lines of gray, like the teeth of a comb, can be seen slowly moving forwards and backward, and he

---

sils known to occur at Sillimans Fossil Mount from a Missionary "who obtained them from the shore of Lake Kennedy, which lies northwest of the head of Cumberland Sound." You told me of another fossiliferous locality more inland, from Sillimans Fossil Mount, and with the known occurrence of Trenton fossils in Ottawa, Quebec, New York, Illinois, Wisconsin, Minnesota and Manitoba, it is highly probable that there was an almost circumferential deposition of Trenton strata around the nucleus of North America, the Laurentian and Huron rocks of Canada and New York.

CHARLES SCHUCHERT.

U. S. NATIONAL MUSEUM, January 31, 1898.

*It was commonly supposed by those who have visited Baffin Land heretofore that these fish were salmon trout, and it was not until a large specimen had been speared in the vicinity of Signuia Point, and others taken in various parts of the bay, that the fact became known that it was the sea trout and not the salmon (found in Greenland and Labrador) which run up these rivers to spawn.

drives the spear into the midst of them. If he captures one fish in fifty throws he considers himself fortunate, but it is a virtue of the Eskimos to be patient, and it is a rare occurrence if he does not return to camp with at least one of these beautiful fish, which average in weight from five to ten pounds.

Constant spearing often scares the trout out of throwing distance, in which case boys are stationed above and below the spearsman, throwing rocks into the river, thus keeping the school continually moving.

Five families of Innuits had, two days before our arrival, left for the interior to the northwest after cariboo (*Rangifer tarandus*). They had taken their entire equipment with them—guns, ammunition, tents, dogs, children—in fact, everything they possessed except their kayaks. These were left at the falls, inverted and resting on piles of stones. Their destination was the southwest shore of Lake Amakdjuak, where game was most plentiful at this season of the year. Although there were countless signs of cariboo in the vicinity of the Jordan River, the presence of the natives had driven them all away from the seaboard.

At 6 o'clock Thursday morning, August 26, the return journey was commenced, setting a course down the coast of Meta Incognita, on the western side of the bay. Taking advantage of the falling tide, the boats passed out of the Jordan River and over the shoals, where Hall in 1861 experienced a "struggle for dear life."

He describes the place as "boiling and seething mill-races, made by the tide as it rushed along." The sound was like the "roar of the sea raging in a storm." Undoubtedly it is a bad place at low tide, but not at all dangerous when traversed at high water. We saw nothing resembling such conditions as these words painted then, probably because it was nearly high tide.

At 10 A.M. we came in between Bishop's Island and the mainland, and found the water so shoal as to require a stop and await the turning tide before going on to the camping place picked out by the natives. This did not occur until well into the afternoon, allowing plenty of time to ascend to the summit of the ridge and obtain a view of the interior. At an elevation of about 1,000 feet one could look westwards into a valley whose bottom lands were so extensive as to remind one of the Connecticut River Valley between Vermont and New Hampshire. Its two rivers also, uniting into one some three miles from its mouth, had the same banks and about the same breadth as the river cited above. Vegetation appeared to be more abundant here than at any other place as yet

XUM

seen during the summer. This stream debouches into the Bay of Rivers.

At the second camp down the coast from the Bay of Rivers an incident occurred which, although insignificant in itself, led to a good deal of the unknown country to the west being thoroughly explored. This was due to two members of the party who had left the boats in the morning, intending to hunt down the coast, and failed to turn up at the camp when night came on. Signal shots were fired through the night and a beacon fire built on the summit of a neighboring ridge. With the dawn, and no signs of the absent ones, the remainder of the party and the entire force of Eskimos scattered up and down the coast and up the passes into the interior. The men were picked up three miles down the coast, but when the party were all congregated at the tent there were many interesting accounts of the country gone over. One member had viewed from a ridge 1,100 feet high a broad valley with its river and sand banks, the river larger even than the one at Bay of Rivers, full of rapids and flowing southeast. Two gaunt, dirty yellow wolves (*Canis occidentalis, var. griseo-alba*) were trotting down the shore of this stream, continually stopping and scenting the air in the direction they had come from, as though they had seen others of the party to the north. Another member had visited two lakes, due west of the camp (which probably drained into the river already mentioned), and into which plunged a waterfall of quite imposing dimensions.

That night it was announced to the natives that we intended going down the coast to the glaciers before crossing to the east side of the bay. Their evident disapproval of such a step was quite apparent, as they explained that no Eskimos ever visited that part of the coast, especially in the summer. Moreover, such a trip would necessitate a long stretch for the boats across the bay, without the friendly shelter of islands in which to seek a harbor should a change of weather require it.

However, the opportunity of seeing so much virgin land was too good to be lost, and for the first and only time on the trip were the Eskimos' objections set aside.*

* No mishaps occurred on this section of the trip. The natives evidently thought we were going farther down the coast. As it was, only the northernmost of the glaciers on Meta Incognita was visited, and a course steered across the bay curving to the northwards and passing near the end of Gabriel Island. This curving to the northwards was almost a semi-circle, described by the boats as they beat up into the wind. It serves to show the caution of the natives. Had the course been straight across to the islands and the wind increased, there would have been danger of being blown out into the bay.

With two stops the coast was traversed from Cape Ramelsburg to Watts Bay, a distance of seventy-six miles. The coastal range presented one unbroken line of jagged peaks, having an average elevation of 2,000 feet. With remarkable regularity narrow valleys

EVERETT MOUNTAINS.

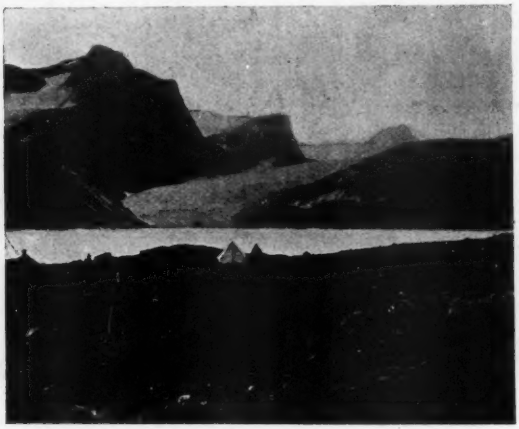
ran from the shore towards the interior, hemmed in by cliffs which rose from their tali sheer to the summits. These summits, that is, all the highest ones, were cut squarely off, and at a distance had the appearance of sharp truncated cones. It was very noticeable how easily their table-tops would adapt themselves to a smooth, flowing horizon line if one imagined the gaps between them to be filled up. It seems rational to assume that this range of mountains was covered at one time with an ice-cap of some size, and that, after its retreat, powerful disintegrating forces had been at work cutting out the valleys. The general strike of the rock (gneiss) for the most part was nearly vertical, the mountain sides being crossed in several places by large dykes.

The 13th encampment was at the head of a bay whose existence seems to be entirely ignored on Hall's chart. In fact, the coast of Meta Incognita appears to be quite inaccurately drawn on the chart accompanying Hall's "Arctic Researches." It is not to be won-

XUM

dered at, however, as he saw a greater part of it from a distance, and that, too, in the winter, when the snow covered both ice and land. Newell Sound is not so large as represented, and two bays indent the coast north of Griffin Bay and south of the one at which we camped.

This bay (13th encampment) is five miles long, with a uniform width of two miles. At its head there is a small lake, about one mile long, which at high tide becomes part of the bay, and therefore slightly brackish.* The latitude of this bay, by meridian altitude, was found to be 62° 48′ N.



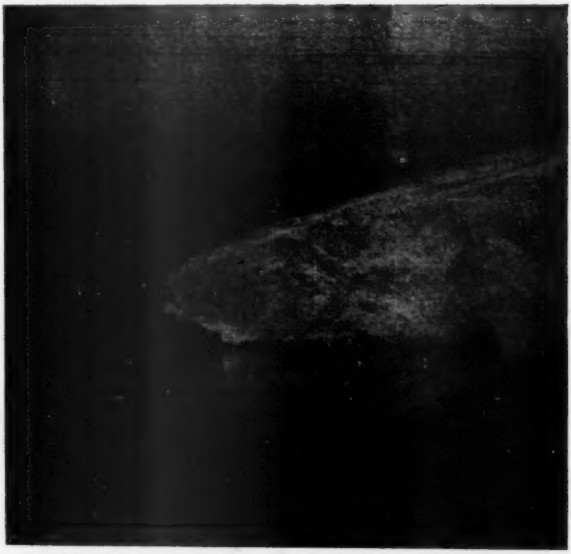
BOAS GLACIER.

Thursday evening, Sept. 4th, the boats entered Watt's Bay (14th encampment), and the tents were pitched on its northern shore, where large circles of stones gave evidence of winter Eskimo encampments. Across the bay, two miles to the southwest, was the blue wall of a glacier, hemmed in on either side by high mountains. On the horizon, back of it, a luminous glare from the ice-cap lit up the fog and mist which was shutting down over the landscape.

The next day, although fog and occasional rain made climbing disagreeable, the glacier was ascended. One mile to the right of

* The Eskimos said there were very large fish in this lake. One native was nearly pulled in by something which had got hold of the other end of his line, only giving up the struggle when the line broke. This was even repeated a second time, and the fish seen, three or four feet long. A few smaller ones were caught and proved to be northern cod.

its face a beautiful waterfall emptied into the bay. From an elevation of 300 feet above high-water this glacial stream slid over the smooth rock in a convex elliptical curve, which at the water's edge was nearly vertical.



FACE OF BOAS GLACIER.

The face of the Boas Glacier* is approximately 150 feet high, and has a frontage of some one hundred yards. The glacier was not discharging to any noticeable extent, there being no bergs in Watts Bay.†

In the centre of the ice stream, and perhaps half a mile from its face, the writer set up a signal pole of bamboo, marking the spot additionally with a pile of rocks. Then cairns were erected on the shore in line with the pole, and sketches of the surrounding locality made for the purpose of identifying the spot in winter.‡

* Named by the writer in honor of Dr. Franz Boas, of the American Museum of Natural History, New York City.

† The larger glaciers of Meta Incognita probably discharge during the summer, as several large bergs were seen on the other side on our way up the bay. These might, however, have possibly found their way into Frobisher Bay from the Labrador Current.

‡ It was the writer's intention to revisit the glacier in the summer of 1898 to ascertain how far down stream the pole had moved, and in this way get at an approximate rate of flow of the glacier. Circumstances compelling his return to the States left this work scarcely begun, which is to be regretted inasmuch as no one has as yet visited the Meta Incognita glaciers to study their movement.

XUM

The Boas Glacier is an easy one to travel on. It has an angle of descent of 15° with the horizon, and on its southern side one can walk directly to the ice-cap above. It can be crossed at almost any point. Its surface is clean and hard, carrying but little detritus, and in September was melting and furrowed by many streams of water. The so-called "pot holes," found in numbers on the Greenland glaciers, were conspicuous by their almost total absence.

At a distance of two miles from the face of the glacier the consistency of its ice changes to that of snow, and half a mile farther on the ice has entirely disappeared as well as the crevasses. The horizon to the west was obscured by fog, but the appearance of the ice-cap at this place was that of rolling plains of snow through which a single nunatak forced itself.

The writer, accompanied by Mr. Shaw, reached this "island of the white sea" after floundering through wet snow knee-deep, and succeeded in reaching its summit, where a cairn was built and a record deposited. It had an elevation above the bay (by aneroid) of 2,380 feet.

The return to Signuia Point, from Watts Bay, was without special interest, as the course was for the most part over familiar ground. The party were stormbound two days in Bear Sound, having made two ineffectual attempts to pass through Lupton Channel, where a line of breakers, due to the setting of the tide against a heavy swell from the Atlantic, checked further progress.

The *Hope* was reached at 5 P.M. of Sept. 12th, and early the next morning she started south, reaching Sydney, Cape Breton, eight days later.

# ORIGIN OF THE CLIFF DWELLINGS.

BY

COSMOS MINDELEFF.

There is no dearth of theories regarding the cliff dwellings, but so few of them are based on actual knowledge of the remains—a knowledge which we now possess—that a revision of the old ideas is in order. Although a cliff ruin was described as long ago as 1850 by Lieut. Simpson, then attached to a military expedition into northern Arizona, practically nothing was known about them then, and in a general way it may be said that our knowledge of these interesting remains dates back only some twenty years, for it was at that time that they were first brought to the attention of the public through the explorations of the Hayden Survey in Colorado and Arizona.

The cliff ruins were at first supposed to be the product of a distinct race, in some way allied to the Aztecs of Mexico, and in the literature of that period we find many picturesque theories regarding them. They were thought to belong to a remote past, and to have been the houses of a part of the people who were left behind in a great migratory movement to the south, the final result of which was the establishment of the Aztec culture about the Lake of Mexico. It was not stated why a part of the people were left behind, nor what became of them afterwards, although some writers have suggested that in the cliff dwellings these people made a last and ineffectual stand against their enemies, who had before driven them to build their houses in the cliffs; in other words, that the cliff dwellings were purely defensive structures. They are still called Aztec ruins in popular accounts, but the term is seldom found in current books.

The study of the cliff ruins was taken up by the Smithsonian Institution about fifteen years ago, and the systematic collection of data was then commenced. It was soon discovered that the ruins and the inhabited villages of the Pueblo Indians pertained to the same people, but to a certain extent the old ideas still cling to the cliff ruins, and there is a strong disposition to consider them a thing apart; if not the product of a distinct tribe, still the result of distinct and exceptional causes. One theory, still to be found in current print,



XUM

has it that the cliff dwellings mark an early period in the history of pueblo Indian culture, when the people were few and not as yet aggregated into large villages, and when each little family was compelled to defend itself against numerous and persistent enemies, building their dwellings in almost inaccessible nooks in the cliffs to render their feeble defence more effective. But house building is an art, and in the study of an art the comparative method is the only one to be followed. A comparison, therefore, between the houses of the cliffs and the present homes of the Pueblos shows that the former are in every way equal to the latter, from an architectural standpoint, and that no cultural sequence exists.

According to a later theory the cliff dwellings were defensive structures built by various pueblo tribes at times when the onslaughts of enemies compelled the abandonment of the villages in which they usually lived, and to which they returned when the necessity for such abandonment was passed. Definite traditions of such occupancy have been collected from several tribes, and it may be that some of the cliff ruins were occupied under these conditions. But it is a question whether their origin is to be attributed to such a cause and it is clear that only a minute percentage of the ruins can be explained in this way.

The American Indian, like all other savages, is extremely sensitive to his environment, sensitive to a degree that we who live under different conditions find it difficult to conceive. He is in such close touch with nature that he responds quickly to her varying moods, and in a few generations he comes directly under the sway of the country in which he lives, not so much in his physique as in his arts and in his ideas. The study of an Indian art must be to a large extent the study of the conditions under which that art developed; or, to put the matter in a more concrete form, the origin of the cliff dwellings is to be found in the study of their geographical environment; it is essentially a geographical question, a question of topography and climate.

The cliff dwellings belong to no class in any division of Pueblo architecture, but to a sub-class pertaining more or less to all of them. They had their origin in a peculiar topographic environment acting through certain industrial requirements, and belong to no particular period either in culture or in time. Many of them are undoubtedly very old, others are modern, and the tradition of the native tribes, that Spanish monks were stationed in some of the cliff dwellings, is supported by the ruins themselves. But in order to

obtain an adequate idea of the cliff dwellings some knowledge of Pueblo architecture is necessary.

In a previous BULLETIN of this society I have sketched in some detail the topographic and physical peculiarities of the Pueblo country, so that a slight description will be sufficient now. That country extends from the Colorado Cañon to the Rio Grande Valley and from Salt Lake City beyond our southern border. Within its area of 150,000 square miles there are thirty inhabited villages and thousands upon thousands of ruins.

The relation of this area to the country at large is well shown on a relief map of the latter. The western third of the United States is mountainous and the pueblo country occupies the southern part of that area. Its limits are practically the same as those of the region which geologists call the plateau country, the topographic features of which are strongly marked and fairly consistent throughout. The dominant topographic form is the mesa, there are mesas everywhere; in short, it is the mesa country. The word, which is from the Spanish and means table, is expressive; mesas are flat-topped table lands, sometimes of small area, but often extending for many miles. A typical example is Thunder Mountain, near the village of Zuñi in New Mexico. This mesa rises about 1,000 feet above the valley of the Zuñi River and is very difficult of access. After the insurrection of 1680, when all the Spaniards in the country were killed or driven out, the Zuñis abandoned their villages in the valley and for over twenty years lived on the summit of Thunder Mountain. About the year 1700 they came down and commenced the building of their present houses.

The mesas are everywhere cut and seamed by cañons, sometimes mere gorges, sometimes interspaces ten or even twenty miles wide. The cañon walls are usually composed of cliffs of vertical rock, 10, 20, or 100 feet high, connected by long slopes of débris composed of fragments split off from the vertical faces. The bottoms of the cañons, as a rule, are flat and composed of rich alluvial earth brought down from above by floods. It is in these cañon walls that the cliff ruins occur, and they were always located so as to overlook some area of good bottom land which was under cultivation.

The edges of the mesas, like the walls of the cañons, furnish an inexhaustible supply of building stone, often of the proper form and size for masonry and requiring no dressing or other preparation. The sandstones of this region are strongly laminated and readily break up into flakes and tablets of almost any size desired. Hence building stone is abundant everywhere throughout the region, and

XUM

it required, as a rule, less work to build a house in the cliffs than in other places.

The unit of Pueblo architecture is the single cell, and there is no doubt that in early days each family built its home wherever it was most convenient. Eventually, however, it was found necessary to combine these little settlements into larger ones, on account of the depredations of surrounding wild tribes, who found in the Pueblo villages convenient store-houses of food. These large villages were usually located in broad, open valleys, as are most of the Rio Grande villages to-day, but the largest clusters are merely aggregations of many single cells.

The pueblo country is in the arid region, and aside from the river valleys cultivable areas are small in size and few and far between. Hence it has come about that many of the people have been compelled to go far from home to work their little farms. As the aggregation of many small settlements into one large village marks a comparatively late stage in pueblo growth, the custom of going away from home during the farming season was more prevalent in the past than it is now, but it is still practised.

The Pueblo Indians are an agricultural people, and have always derived their principal subsistence from the cultivation of the soil. They do so now as much as ever, and the Pueblo of Zuñi, the largest of the villages, has no less than three subordinate settlements, established for convenience of farming lands in the vicinity. Some of these are fifteen miles from the home village, and to go back and forth daily would be impracticable. Hence farming shelters are put up convenient to the fields, and are inhabited only during the season; after the harvest, the people return to the home village. Among the Moki Indians of Arizona, whose cultivated fields are in broad valleys some distance from the mesas where the home villages are, and where building stone is difficult to procure, it is customary to erect a rude platform of logs, with a screen of boughs on the windward side. This meets the two requirements—outlook over the fields and a place to live and sleep. Where building material is more abundant, these shelters take the form of regular houses. Sometimes the houses are in clusters, sometimes they stand alone; it depends on the extent of cultivable ground overlooked by them. But their use is always the same; they are occupied during the season, and after the harvest the people go back to the home village.

That the same practice prevailed in ancient times is evidenced by the ruins of thousands of single rooms which are found throughout the ancient pueblo country. In fact, it might almost be said

that wherever there is a little area of good land the remains of a house or of a small cluster may be looked for, and somewhere in the vicinity the home village will be found. Often the little outlooks were perched on high rocks, or even on large boulders. From these farming outlooks it is but a step to the cliff ruins, most of which are single rooms, or small clusters of rooms located in the cliffs, because only from such places could an outlook be had over the cañon bottom below. Nine-tenths of the cliff ruins are of this type, and the home villages to which they are related are to be found not far away. Not infrequently it happened that the site was occupied without the erection of any building upon it. The general character of the sites occupied by these outlooks is always the same: slopes of broken rock and débris extend up to them, and access is generally easy, if the explorer is familiar with cliff ruins and knows where to look for the trail. The ruins are nearly always located on narrow ledges in the cliff, and sometimes can be reached only by ascending the ledge at some point below or above. Of many hundreds of ruins that I have examined I can recall only two or three which could not be reached without the aid of other appliances than my hands and feet; and there is a fair presumption that the cliff dwellers themselves, accustomed from their earliest childhood to climbing about the cliffs, did not regard their homes as especially difficult of access.

The largest group of cliff ruins so far known was found in Cañon De Chelly, in north-eastern Arizona. Although situated in the heart of the Navajo Reservation, difficult to reach, and therefore seldom visited by whites, the cañon has been accurately mapped and parts of several years have been devoted to the study of the ruins. There are 140 of these ruins in the cañon and its branches.

De Chelly proper is about 20 miles long, with a general east and west trend, and lies on the western flank of the Tunicha Mountains. Its principal tributary, known as Del Muerto, is about 15 miles long, and comes in from the north. With all its turns and including all its branches the cañon is about 80 miles long, but most of the ruins are found in the middle parts of De Chelly and Del Muerto. At its mouth, the only place throughout its length where a wagon can enter, the walls of the cañon are but twenty feet high, and five hundred feet apart. The bottom is composed of a smooth stretch of white sand, into which the vertical walls are merged without any talus or intervening slope. In this part of the cañon there are no ruins. A little further up the talus begins, and with it many small areas of fine bottom land, formed of rich alluvial soil,

XUM

are found. Here the ruins begin, and they are invariably located so as to command an outlook over some bit of good land. Still further up the bottom lands attain their greatest development, and the ruins also are most abundant. At ten or eleven miles above the mouth of the cañon the talus begins to encroach on the bottom lands; here it consists of smooth sloping rock, either bare or but slightly covered with débris. Beyond this point the ruins become less abundant, and, as the talus finally blots out the bottom lands, meeting in the centre to form a narrow gorge, the ruins disappear. The cliff walls are not continuous, but run in and out, forming sharp promontories and deep coves, the latter sometimes running backward into little branch cañons a mile or more in length. In these places, where the bottom is flat, there are ruins; where the talus meets in the centre there are none. The little stream which meanders through the cañon carries water only during part of the year, but now and then, when in flood, it becomes a raging torrent impassable to man or beast. Ordinarily the only way in which one can procure enough water to drink is by digging a deep hole in the sandy bed of the stream and thus catch a little of the sub-surface drainage.

The walls of De Chelly are composed of brilliant red sandstone, discolored in places and streaked with black and grey. They increase in height gradually as the cañon is ascended, and a few miles above its mouth are over a thousand feet high. The region outside the cañon is densely wooded, but the height of the cliff is so great that the trees along the edges can hardly be seen. In the upper parts of the cañon, however, there are a few trees in the foothills and on the bottoms, and these form a pleasant contrast with the highly colored sandstone of the cliffs. The sandstone is soft and has been eroded by the winds and flying sand into grotesque and sometimes beautiful forms. In places great blocks have been split off by the action of frost, and the débris has sunk in the sand or been carried away by the stream, leaving huge walls 500 feet or more in height and width, smoother than any masonry could be. In such places ruins are never found, but localities where there was both an extensive outlook and easy access were favorites of the old builders. The bottom lands are old alluvial terraces, ten to twenty feet above the stream and now beyond the reach of high water.

The cliff dwellers in the Cañon De Chelly, like the Pueblo Indians of to-day, were a very religious people. Among the latter this feeling finds vent in the sacred dances which solemnize all the important events of the Indian year. The dances are often dramatic

representations of mythologic events, or a form of prayer for favors sought, or perhaps of thanksgiving for favors received. They are of frequent occurrence during the season when the men are not at work in the fields. Perhaps the most striking of these ceremonies is the snake dance of the Mokis of Arizona, which is in effect an invocation to the rain god to send showers of rain to his suffering children. In one of the figures of the dance snakes dropped from the mouths of some of the dancers are picked up by others charged with that special duty. Finally, when the stock of serpents is exhausted, all those which have been picked up are thrown into a heap on the ground. Then all the dancers scramble for them, and each seizing as many as he can, runs off at full speed to release them on all the trails leading out of the village. The idea is that they will seek the rain god, whose form is that of a gigantic serpent, and tell him what is wanted.

Many such ceremonials as this must be performed every year, but the rites which take place in public are usually the culmination of a long series. In the snake dance, for example, there are eight days of preliminary ceremonies; these take place in sacred underground or partly underground chambers known as kivas or estufas. Access to these chambers is always by a ladder through a trap-door in the roof, and no exterior openings of any kind are permitted. The kivas are usually put outside of the village or in an interior court. In these chambers all the religious and civil business of the tribe is transacted, and they are clearly the most important structures in the village. Some of the larger villages have twenty or more, others have only one or two.

The significant point is that in the summer settlements, designed for use during only part of the year, no kivas are ever found, for all the important ceremonies take place in the home village, most of them between harvest and planting time. In this feature, then, we have an excellent criterion of the character of a village ruin, and the application is made easy by the fact that in the principal cliff ruin groups, as in some of the pueblos, the kivas are circular in form, and can be distinguished without difficulty. A fine example of this circular form of kiva was found in a large ruin in Cañon Del Muerto. It consists of a round shaft some twenty feet in diameter, sunk about six feet into the ground, lined with masonry and smoothly plastered. There are many examples among the ruins, and it may be assumed that wherever the remains of a kiva are found the settlement was a home village, and where there was no kiva the settlement was occupied but a part of the year, for

certain ceremonies must be performed and to do this a kiva must be provided.

If we apply this rule to the ruins in Cañon De Chelly we find that perhaps nine-tenths of them were farming outlooks, occupied but a part of the year. But the home villages with which they were connected were not far away. There are numerous remains on the cañon bottom, usually at the foot of a cliff, but of such easy access that a wagon could be driven into most of them. One of the largest ruins in the cañon is called by the Navajos Pakashi-izini, from a pictograph of a cow on the cliff wall. Some of the walls are still standing to a height of three stories. The ground plan shows the remains of fifty-five rooms and of three circular kivas. There were altogether about ninety rooms, and the ruins cover an area 400 feet long by 40 feet wide; the population was probably about twelve families. In other words, the largest ruin in the cañon had only a small population, and as each family doubtless had some farming outlook in the vicinity, it is not necessary to assume a large number of inhabitants to account for the ruins in Cañon De Chelly. Many of the ruins of this class are quite small, and some of them could hardly have given shelter to more than two families. Only a bit of standing wall remains here and there, but no matter how small they may be they invariably show traces of one or more kivas.

One of the most interesting ruins in De Chelly is known as the Casa Blanca, or White House. This is the ruin which was described by Simpson in 1850. Part of it is on the cañon bottom and part in a cove some 35 feet above. Above the ruin the cliff extends 500 or 600 feet and overhangs about 120 feet, so that the dwellers were well protected from the weather. Although the upper ruin is now very difficult of access, there are marks upon the vertical wall which prove that at one time there was a continuous series of rooms rising from the ground to within four feet of the ledge, and access to the upper part was almost as easy as to the lower. The ground plan of the ruin is of especial interest for it demonstrates that not all of the ruin was built at one time. The kiva in the centre and the heavy walls to the right are of masonry, while the thinner walls in front of the kiva were made of adobe mud. As there is more than a presumption that adobe was not used for construction prior to the Spanish Conquest, its presence here is significant. Moreover, there is evidence in the plan that the use of adobe came at a late period in the occupancy of the site. The Navajos have a tradition that a Spanish monk was stationed here.

The same tradition attaches to the ruin called Mummy Cave, one of the largest in Cañon Del Muerto. The ruin consists of three parts: a large cove on the right, a smaller one on the left and an intermediate bench, almost completely occupied by heavy walls. At one end of the bench the walls still stand, in tower-like form, to a height of three stories, and retain their roof intact. The ground plan shows fifty-five rooms, together with three kivas; all of the latter are in the larger cove. There may have been altogether ninety rooms, but as many of them could have been used only for storage, the total population could hardly have been more than sixty persons. The intermediate ledge, which is 110 feet long and 30 feet wide, was covered by seven rooms, all of exceptionally large size and with walls over two feet thick. A large boulder on the ledge was not removed, but instead the walls were carried directly over it.

The right-hand or larger cove is 200 feet across and about 100 feet deep. The ruins occur along a narrow ledge at the back of it. There are remains of three kivas here, perhaps four, and one of them, in the centre, still shows part of a second-story wall. The left-hand cove is much smaller than the other and could be reached only from it, over the intermediate ledge. There were no kivas here and no place for one, and this fact suggests an interesting speculation: if a mission existed here some time in the 17th century, as the Navajo traditions aver and as evidence in the ruin suggests, the monks undoubtedly occupied the central ledge, where the very large rooms with heavy walls occur. This much being granted, it seems plain that the small western cove was used by the converts, and in this arrangement there is a suggestion that the Christian cliff-dweller, like the early converts in other lands, was made to lead a hard life by the unbelievers. It is known that several of the Pueblo villages in the west were completely destroyed because they were supposed to favor the new religion.

Mummy Cave ruin commands a fine outlook over the cañon bottom; in fact, extensive outlook was always a *desideratum* with the cliff-dwellers as with those of the tribe who dwelt in other localities. A typical example of the latter class is a ruin opposite old Camp Verde in Arizona. It occupied the point of a hill, and commanded a view of many miles up and down the Verde River.

Near by is the celebrated cliff ruin which is known as Montezuma Castle. It is near the mouth of a little flat-bottomed cañon through which Beaver Creek flows to join the Verde, and is near the top of the cliff. It is now accessible only by the aid of

ladders, and commands an extensive view over the bottom-lands. A ruin occupying a somewhat similar site, but in a much higher cliff, occurs in Cañon De Chelly. The ground plan shows sixteen rooms and two circular kivas, but although the ruin is eighty feet vertically above the bed of the stream, access is only a matter of agility. The rock is cross-bedded and has weathered into little ledges, inclined at an angle of 45 degrees and an inch or two wide. With proper care a man can easily walk up these inclined planes. This ruin contains the only structure so far seen by me which could be properly classed as a reservoir. It is on the extreme end of the ledge farthest from the ruins, and is so situated that it is directly above the stream, yet the sun shines upon it only for an hour or two each day. On the cliff back of it there are numerous paintings of tadpoles and other water emblems in common use among the Pueblos.

The irregularities in the ground plans of ruins are due to a peculiar cause. Fronts of adjoining or connected houses are seldom on a line; in fact, the contrary is the rule. The front line is always broken by jogs and offsets, not only in the first story, but in the upper ones as well. The same variety prevails in finish. Some houses are smoothly plastered, others are left rough. One house will be three stories high, while the adjoining one will be two stories or perhaps one. In Zuñi the same conditions prevail; in fact, they extend through the whole system of Pueblo architecture, for they grow directly from a long-established social custom. Among all the Pueblo Indians descent and inheritance are in the female line only. The children belong to the mother and are members of her clan. The father has no rights over them; in fact, his own standing is merely that of an honored guest, for when he marries he goes to the house of his wife's people and becomes a member of her family. If he does not behave himself he can be sent home.

It follows that a family in which there are many girls must grow, while that in which there are only sons must become extinct. As the girls marry and the family increases more room is required, but by a rule many centuries old, the new rooms must be built adjoining and connected with those already occupied by that family. Thus building is always going on, new houses are being erected, while old ones, perhaps only a few steps away, are going to decay. The building of a house is partly ceremonial and is always done by women, although rock, roof beams, and such heavy material is provided for them.

The irregularities in ground plan, therefore, are not due to mere lack of skill, but have a certain significance. Knowing a little of the conditions which prevail now and of the way in which they affect the ground plan, we can infer something of the conditions under which the ground plans of old ruins were produced. We can read in them the story of long periods of time when girls were given in marriage, when the village grew, and peace and plenty prevailed in the land. We can also see the times when dangers and trouble prevented the addition of new rooms, when old rooms were divided instead of new ones built, when the village grew more and more compact, less and less comfortable. From the plans also we can estimate how long the site was occupied, but we cannot as yet set dates for the beginning and end of that occupancy, except in a few cases.

The Navajos, who farm the bottom lands of De Chelly, usually store the products near the fields until such time as they are needed. For this purpose they build cists, which are filled up with corn and other grain and carefully concealed. The cliff dwellers followed the same practice, and hundreds of their old storage cists are to be found throughout the cañons. Sometimes the cists approach the dwellings in size, and it is not unlikely that many of the cliff outlooks were used for storage at times when they were not occupied. In the Navajo mind the cliff dwellings are tabooed, and under no circumstances will a Navajo make excavations in a ruin. They taboo their own dead, and something of their disposition not to touch anything from the ruins may arise from the fact that for many years their dead have been buried there. Their burial cists are small dome-shaped structures of masonry, flimsy in construction, but closed all round except a small square hole, which is always left in the top for the free egress and ingress of the spirit or ghost. Of the numerous human remains which have been taken from the cliff ruins, probably nine-tenths are of this class—that is, intrusive burials.

That the cliff dwellings were the direct result of a peculiar geographic environment is proved by the fact that marked changes in environment produce similar changes in the ruins. In the valley of the Rio Grande, the home of the Pueblos, there are no cliff dwellings, for the geologic formations there are not favorable to them. Similarly, in most of the valley of the Rio Verde, in Arizona, there are no cliff dwellings, but instead of them we have cavate lodges, as they have been called—actual caves excavated in the rock. They differ from cliff ruins in that they are artificial caves, whereas, in

XUM

the cliff ruins no excavation of the rock is ever made. In the latter houses are built in shallow coves, but as a rule houses exactly like them might as well be built in the open country. In the cavate lodges there is no construction, except, perhaps, about the doorway. A small doorway gives entrance to a narrow passage, perhaps six feet long, and this in turn to the main chamber, rudely circular in form, fifteen or twenty feet in diameter, and seven feet high. With this central chamber other smaller rooms communicate, sometimes as many as four in a series extending back fifty feet into the rock. But in all examples which have been found the rock is so soft that it almost crumbles in the hand. It is easily worked without tools, and less labor was required to excavate the lodges than would be necessary to build the same number of rooms on a ledge of the cliff.

Cavate lodges have been found only in four localities,—on the Verde, in the San Francisco Mountains of Arizona, on the San Juan, and on the Rio Grande. In all cases they occur in a material resembling volcanic ash, and are merely a variant of the cliff dwellings, due to peculiar geographic or geologic conditions. The doorways were made as small as possible, for there was no way of closing the opening in bad weather other than by hanging a blanket over it. It was made larger in the upper part than in the lower in order to facilitate the passage of a man loaded with a back load of wood or other bulky material. The same purpose was served in some of the cliff dwellings by T-shaped doorways.

In conclusion, a few remarks on the probable development of Pueblo architecture may not be amiss. There is little doubt that Pueblo architecture developed in the country where it is now found, for the almost complete adaptation to environment which is exhibited by it could come only from local origin. Had it been developed elsewhere and brought into the Pueblo country it would surely contain some evidence of its previous existence. Such evidence is always to be found in a transplanted art, and, above all, in a transplanted system of architecture, where forms, for example, derived from wooden construction are later embodied in stone.

In Pueblo architecture there is but one such survival, but that one is especially significant. The preservation of kivas of circular form, used in conjunction with rectangular rooms, has been accomplished at a great cost of convenience. That it was accomplished shows how strong a hold conservatism in matters religious has upon the human mind, for it is undoubtedly a survival from the time when the people lived in circular lodges like the Navajos

of to-day. Many of the rites and sacred ceremonies came down unchanged from that time, and they could be properly performed only in a circular chamber.

Another point which should be emphasized is that the unit of Pueblo architecture is always the single cell. The largest clusters in the valleys were merely aggregations of such cells, and the most difficult sites among the cliffs could not affect them. While differentiation in function had taken place as much in the cliff ruins as in the large valley pueblos, differentiation in form had not yet begun. Except in the doubtful examples in Mummy Cave ruin, which are possibly of Spanish origin, the individual rooms are practically of the same size and form throughout.

The cliff ruins are not an early, nor in fact any, stage in Pueblo architecture. They had their origin in that geographical peculiarity of the country whereby areas of good land are of small size and widely scattered, and in the habits of the people, who were essentially farmers and dependent on the products of the soil for subsistence. They belong as much to the latest as to the early forms of Pueblo villages, if not more, and in themselves exhibit a long sequence in time, but not in development. They are not a type, but a sub-type, pertaining to various other types of villages. They are exceptional only in the sites they occupy, and these sites are merely the product of a peculiar topography.

The cliff outlooks in Cañon De Chelly and other regions, the cavate lodges of New Mexico and Arizona, the watch towers of the Zuñi country and of the San Juan, the single-room remains found everywhere throughout the region, even the brush shelters of Moki, are all functionally the same, differing in form only because of a varying geographic environment.

XUM

# RECENT ADVANCES IN GEOGRAPHIC KNOWLEDGE

## Accomplished by the United States Hydrographic Office at Washington.

BY

G. W. LITTLEHALES.

The efforts of the Hydrographic Office of the Navy Department in the field of geography must be primarily to help the navigator. Working as it does in the interests of the marine of the United States and of those classes of our citizens whose interests are promoted by every advance in the safety and celerity of navigation, the production of good navigational charts and the deduction of the best routes to be followed by steam and by sail have constituted the principal aim. In pursuing this aim the domains of the geography of the land, the geography of the sea, and the geography of the air have been entered.

The most recent of the expeditions sent out by the Hydrographic Office for the telegraphic determination of longitude returned to the United States in 1890, after having determined the longitudes of seven of the important secondary meridians of Mexico, Central America, the West Indies, and the north coast of South America. There have been directly determined by these various expeditions about forty secondary meridians, by which the longitudes of the principal maritime and geographical centres of the Western Hemisphere and of China and the East are accurately related to the established meridians of the United States and Europe. Many more positions depend upon these, so that they may be said to have made a large addition to our accurate knowledge of the earth's surface.

The vessels engaged in maritime surveying have, since 1885, extended the Pacific coast work of the Coast and Geodetic Survey, as far as it relates to the construction of nautical charts, from the boundary line between the United States and Mexico southward along the entire western coast of Lower California and northward along its eastern coast to La Paz—a distance of more than 1,000 miles.

The officers of the U. S. S. *Michigan* on the Great Lakes have surveyed the western part of Lake Erie, the Detroit River, and the harbors of Chicago, Cleveland and Erie, and furnished data for representing upon the charts many rocks and shoals, which the

increasing number of deep-draft vessels yearly discloses in these waters.

The officers of many of the United States vessels engaged in the general naval service have contributed surveys and geographical information relating to the places visited by them. In this way great improvements have recently been made in our charts of the harbors of Colon and Panama at the Atlantic and Pacific termini of the Panama Canal route, of Greytown and Brito at the Atlantic and Pacific termini of the Nicaragua Canal route, of the principal commercial ports of Honduras and Guatemala, of Honolulu and Pearl River in the Hawaiian Republic, and of other ports and special localities in various parts of the world.

In 1889 there was an important accession to our knowledge of the Arctic regions through the cruise of the U. S. S. *Thetis*, along the entire main coast line of Alaska from Port Tongass, in extreme southeastern Alaska, to Demarcation Point, in the Arctic Ocean. The cruise of this vessel was remarkable in several respects. By successful battling with the ice-pack, she was enabled to reach Mackenzie Bay, in British North America—the first Government vessel to carry the American flag in these waters. She also made the long stretch from Mackenzie Bay to Herald Island and Wrangel Land in one season, which was never before done.

Drawing upon the common stock of geographic knowledge and upon the geographic information which thus comes into the custody of the Navy Department, during the last decade, a set of general coast charts of the Western Hemisphere has been constructed; sets of special coast charts, harbor charts, and special charts have been completed to the extent of four-fifths; and the work has been extended into the Eastern Hemisphere where the general coast charts of China and Japan are practically complete, and where work is in progress in reference to the general coast charts of southern and eastern Africa.

The observations made in recent years to determine the magnetic declination, inclination, and intensity in connection with the surveys carried on under the authority of the Navy Department and in the navigation of the vessels of the Navy, have been discussed with a view of assigning the correct direction of the magnetic meridian on the charts, and also to throw light upon the causes and character of the secular variation of the magnetic needle. The publication of these observations and results forms an important contribution to the science of terrestrial magnetism.

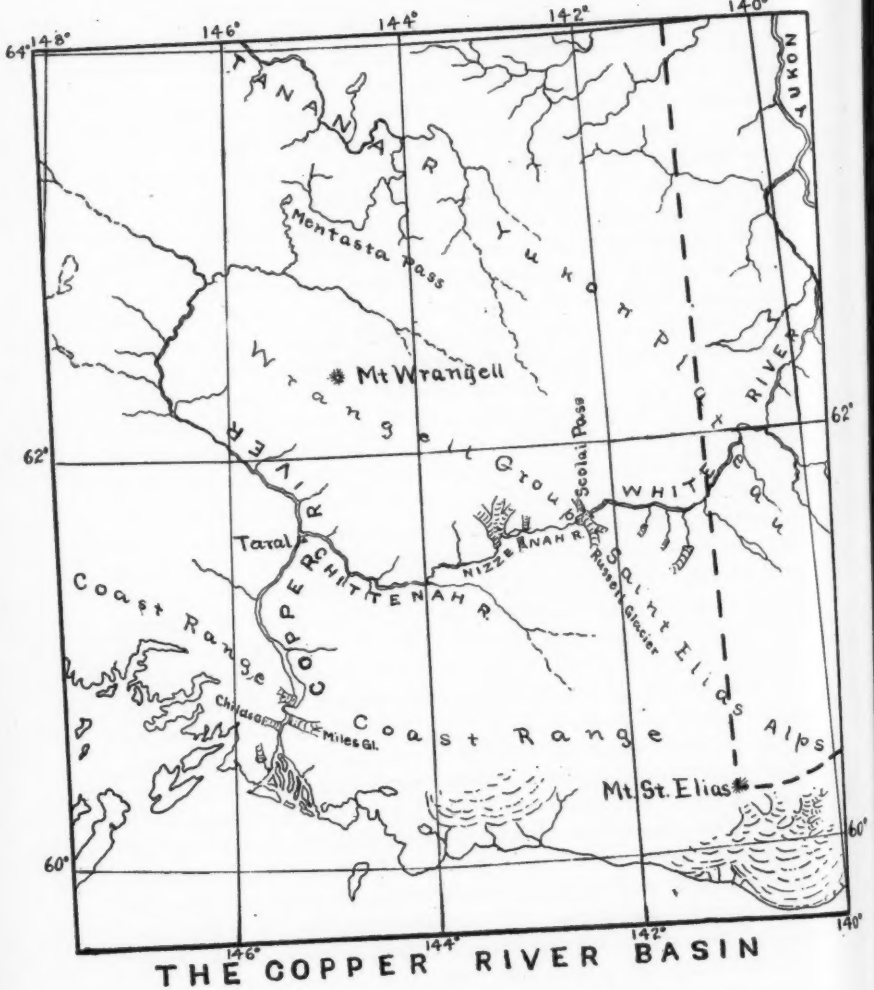
Toward the increase of our knowledge of the geography of the

XUM

sea, besides a specially planned survey carried on in 1892 to determine a practicable route for laying a submarine telegraphic cable between California and the Hawaiian Islands, many deep-sea soundings and observations of density and temperature have been made by the naval service in the waters of all the great oceans. These observations have been of service in providing for the expanding system of submarine cables and also in the problems relating to ocean physics; for which latter purpose, especially in their bearing upon ocean currents, the reports of incoming navigators have been carefully collected and studied. Knowledge of the tides has been improved in relation to certain localities where data have been observed; and at Chemulpho, in Korea, and Magdalena Bay, in Mexico, series of observations of sufficient extent have been made to warrant their investigation by the harmonic analysis. The resulting tidal constants for these stations have been published for the benefit of those who are engaged in the prediction of tides.

From the information extracted from the log books of vessels voyaging in all parts of the world, monthly normal isobarometric and isothermal values have been deduced for some parts of the great oceans, notably the North Atlantic and North Pacific. The charts of these lines show the average distribution of the quantity of matter in the earth's atmosphere, which is identical with the distribution of barometric pressure, and depends solely upon the distribution of temperature over the surface of the globe. If the monthly average directions of the winds and currents, which have recently been much improved by our latest deductions, are also delineated upon such a chart, the direct relationship between pressure, wind, and current, now completely established by meteorologists, will be readily apparent. Besides these results in the climatology of the sea, the regular observations of mariners have provided for some progress in dynamic meteorology. Daily synoptic charts of the North Atlantic and North Pacific oceans, showing the prevailing weather and the progress of storms that cross those regions, have been prepared for several years past; and there are published each month pilot charts of the North Atlantic and North Pacific oceans, showing graphically the matters of value and interest to the maritime community, and particularly the directions and forces of the winds to be expected during the month succeeding the date of issue, the set of currents, the feeding grounds of marine animals, the regions of storm, fog and ice, the positions of derelicts and floating obstructions to navigation, and the best routes to be followed by steam and by sail.

XUM




THE COPPER RIVER BASIN

XUM

# COPPER RIVER AS A ROUTE TO THE YUKON BASIN.

BY

C. WILLARD HAYES.

The experiences of the past season on the lower Yukon and the trails leading into the interior from the head of Lynn Canal have shown conclusively that the present means of access to the Yukon basin are wholly inadequate to the demands already made upon them. The demands of the near future will be vastly greater, and much attention is being directed to the possibilities of routes with reference to the construction of wagon and rail roads. From an inspection of the map of North America the Copper River appears to offer a direct and easy route, and numerous accounts of projects for utilizing it have been published in the newspapers. In view of the serious results which are liable to follow mistaken ideas as to the character of the river and the passes leading from its headwaters to tributaries of the Yukon, it seems desirable that all available information concerning it should be made public.

The Copper River was ascended by the Russian trader, Seréberinikoff, in 1847, to a point about 60 miles above Taral, where he was murdered by the natives, but his notes were brought back to the coast, and, although meagre, they for many years formed the only source of authentic information on the region. In 1884 a party under Lieutenant Abercrombie was sent out by General Miles, then commanding the department, to explore the river. He succeeded in ascending only a few miles above the head of the delta, and was turned back by the lateness of the season and the obstacles which he met there.

The following year a party was organized under the command of Lieutenant Allen. On account of the difficulties of ascending the river by boat, which Abercrombie had encountered, he determined to go up before the ice went out of the river, carrying his outfit on sledges. Owing to various causes his departure from the coast was delayed until the snow and ice had become soft, so that he encountered severe hardships on the journey, but by almost superhuman efforts was able to reach Taral before the ice on the river became entirely impassable.

From Taral he went eastward up the Chittenah, the east branch of the Copper River, for about 75 miles. He there found Nicolai,

the chief of the Copper River Indians, and, obtaining from him a crudely built boat, he descended the east fork, and continued his journey up the main Copper River to the Mentasta pass, by which he crossed the divide to the Tanana. The account of this remarkable trip of Lieutenant Allen, published in 1887, contains practically all the available information concerning Copper River. Inasmuch as he traversed the lower part of the river, where the most serious obstacles to navigation occur, before the ice was out and while the country was still covered with snow, he was unable to obtain much information as to the practicability of its navigation. Since Lieut. Allen's explorations, the river has been ascended varying distances by an occasional prospector or trader, but no record has ever been published of their experiences or observations.

The problem of utilizing the Copper River as a route to the Yukon basin may be divided into a consideration of the river itself and the Mentasta and Scolai passes leading from its headwaters to the interior drainage. The passes will be considered first.

Mentasta pass has been described by Lieut. Allen. It lies almost due north of Mount Wrangell and leads from the upper part of the main Copper River valley to the headwaters of the Tanana. This region forms a part of the great Yukon plateau, the altitude of which is here between 4,000 and 5,000 ft. It is an undulating upland, above which rise numerous hills and short mountain ranges, though none of the latter carry snow throughout the year. It is sparsely wooded and dotted with innumerable small lakes. This pass, therefore, presents few difficulties to the construction of trails or wagon roads, or even to the building of a railway. It leads, however, only to the Tanana, a river so obstructed by cañons and rapids that its navigation is wholly out of the question, and a route through this pass would have to cross the Tanana and be continued all the way to the Yukon.

Scolai pass is much the more direct route from the coast to the Yukon. It leads from the head of the Nizzenah, an eastern tributary of the Copper River, to the head of White River. Its altitude is about 5,000 ft., or less than 1,000 ft. above the upper White River basin. Unlike the Mentasta pass, it is a deep narrow cut through a lofty mountain range. Much of its northwestern wall is precipitous, the cliffs rising almost vertically from 2,000 to 5,000 ft. From the southeast the magnificent Russell glacier flows down into the pass, and, striking the opposite wall, sends a lobe towards the northeast, from which the White River takes its rise, and another towards the southwest, feeding the Nizzenah. The latter stream continues

for a distance of 50 miles from its source through a deep narrow valley, which is simply a continuation of the pass itself. The high mountains on either side discharge large glaciers into the valley, the ice at one point damming the river and forming a considerable lake. It will be readily seen that this pass, although low and direct, is entirely impracticable for pack animals or as railroad route. Indeed, it is used by the natives only in the winter, when the rivers are frozen and they can travel on snow-shoes, since the steep slopes are covered with a growth of spruce and alder almost impenetrable.

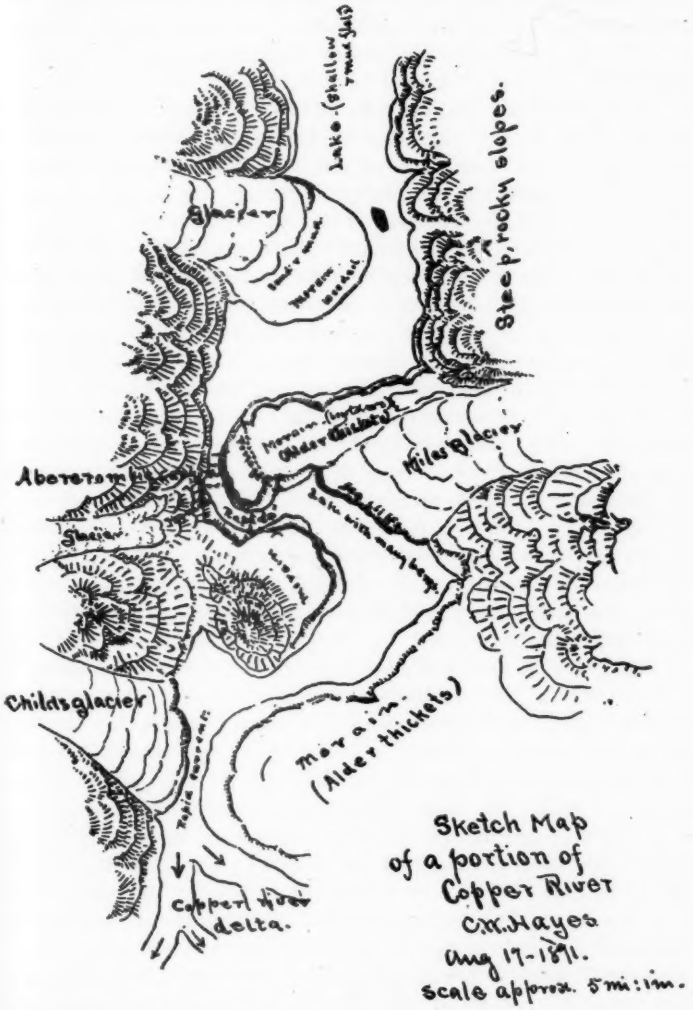
Copper River receives many tributaries above Taral, but is chiefly formed by the confluence of two main branches about 50 miles northwest of Mt. Wrangell. From this point it is a river of considerable size, but rarely flowing in a single channel. It is generally bordered by gravel terraces, 100 to 200 feet in height, between which the river meanders, with a densely timbered flood plain several miles broad. Its channel is interrupted by innumerable islands and bars; the current is swift, and the water is seldom more than a few feet in depth.

The Chittenah River has essentially the same character as this upper portion of the Copper River. In fact, the Chittenah and the first hundred miles of Copper River, above Taral, occupy the axis of the same orographic depression, a broad valley lying between divergent mountain ranges, the coast on the south and the Wrangell group with the connecting spur of the St. Elias Alps on the north. The volume of the Chittenah is nearly equal that of the Copper at their confluence. Although the former has much the smaller drainage basin, it lies partly within the coast belt of heavy precipitation, while the upper portion of the Copper basin lies in the region of scanty rainfall to the north of the Wrangell group. Copper River might probably be navigated by a light steamer about 150 miles above Taral and the Chittenah about half that distance. There are no rapids or rocky obstructions, and the difficulties encountered would be only such as are connected with the navigation of shallow, rapid streams carrying great quantities of coarse sediment. Immediately below Taral the river is contracted greatly and enters a narrow cañon, with abrupt walls 100 feet or more in height. This cañon is something less than a mile in length, and would probably present no serious obstacle to navigation. The current is rapid, but the channel is deep, and there are no obstructions which prevent the descent with a canoe. The difficulty of ascending would be much greater for a small boat, but a steamer of

moderate power would doubtless be able to make the ascent in perfect safety.

Below the cañon the river again spreads out and forms a large number of channels among sand bars and low gravel islands. No boat drawing less than 16 to 18 inches of water would find much difficulty in getting over these bars, as the current is not sufficiently strong to be a serious obstacle, and no bad rapids occur. This character of the river continues for about forty miles. The flood plain of the stream then gradually broadens and the current slackens, with a corresponding decrease in its carrying power and in the size of material deposited. The river here forms a delta in fact, filling a recently formed lake. This slack water extends for a distance of 15 miles. The lower portion is a broad and muddy flat, through which innumerable small streams meander. Beyond the mud flats the river expands into a small lake, the remnant of one originally much larger, but gradually filling up. Below the lake is found the obstruction to which it is due. (This portion of the river is shown on the large-scale sketch map accompanying.) The great excess of precipitation on the southern side of the coast range causes the snow line to approach much nearer sea-level there than in the interior. The lower limit of perpetual snow has a difference in altitude on the opposite sides of the range of something more than 4,000 feet, and this notwithstanding the fact that the mean annual temperature in the interior is many degrees lower than that along the coast. As a consequence of this rise in the snow-line and less abundant precipitation, the glaciers flowing from the northern portions of the range are insignificant compared with those which flow from the southern side. The mountains around Taral do not furnish any glaciers. Descending the river, a few small ones may be seen high up on the mountain sides, but none reach the river valley until near the coast. In descending the river the first one encountered which reaches the valley is a large double glacier coming in from the west. This has pushed its terminal moraine out into the expanded portion of the river, and forms an ice-cliff for a few hundred feet at its northern margin, as shown in the map. For the most part, however, the ice is separated from the river by a broad mud flat. A short distance below a much larger and more active glacier, named by Abercrombie after Gen. Miles, comes in from the east. Within comparatively recent times it doubtless extended entirely across the valley. It has brought down large quantities of rock, and while it had a much greater extension than at the present, its northern lateral moraine was built entirely across the valley.

The ice has since retreated, but this lateral moraine remains and forms the barrier to which the slack water is due. A smaller glacier comes in from the west directly opposite the Miles Glacier,




and the material which it has brought down has assisted in the formation of this dam. The river has been pushed to the extreme

western side of its valley, and for a distance of about two or three miles flows in a shallow cañon whose sides are made up in part of rock, but chiefly of coarse moraine material. The river channel is narrow and the current very rapid over a rough boulder bed. The amount of fall has not been determined, but it is probably between 50 and 100 feet. This was named Abercrombie Cañon by Lieutenant Allen.

From the lower end of the cañon a strong current enters another body of slack water and strikes against the ice-cliffs, which terminate the Miles Glacier. These ice-cliffs are between 200 and 300 feet in height, and are discharging bergs almost continuously. The lake in front of the glacier is filled with these bergs, and is frequently thrown into the most violent commotion by the fall of a large mass of ice. With a strong wind from the south, which is the prevailing direction in summer, the ice is driven into the northern end of the lake, forming a dense pack capable of grinding to pieces any boat which might get caught there. This, together with the current of the river, makes the passing of this lake extremely hazardous, and unless the conditions are favorable the Indians prefer a portage, not only across the moraine on the north, but across the three or four miles as well. It should be said that there is evidence of the rapid recession of the front of Miles Glacier, and this may have gone so far since 1891 as to greatly lessen the danger of passing it. Beyond the front of Miles Glacier the river bears toward the southwest, still with a slack current, and within a few miles strikes the front of the Childs Glacier, which enters the valley from the west.

This presents an ice-cliff to the river only along the northern part of its front, its southern portion descending to the river by a gradual slope. The strong current sweeping past its foot carries off the ice as fast as it falls, so that it does not accumulate as in front of the Miles Glacier, and consequently forms a less serious obstacle. It is not, however, entirely harmless, as a prospector reported that in passing it a large berg was discharged, and the consequent swell overturning his boat carried it far up on the opposite beach.

A short distance below the Childs Glacier the river expands and breaks up into a number of channels between bars of coarse gravel. This is the head of the Copper River delta, which extends for a distance of about 30 miles to deep water. The material deposited becomes rapidly finer, and the lower and more extensive portion consists of broad mud flats.

It appears that there would be no serious difficulty in finding a channel through the delta which could be navigated by light draft steamers.

From the foregoing it will be readily seen that the Copper River presents serious obstacles to navigation. The rapids of the Abercrombie Cañon are, perhaps, the most serious, and it will probably be found quite impossible to ascend them with any kind of a boat. A portage across the main dam of about 2½ miles will then be necessary, to the slack water above Abercrombie Cañon. From this point, 16 to 18 inches of water can be depended upon to the Taral Cañon. Here the current is swift, although the water is deep, so that a boat of considerable power will be required to make the ascent. From Taral northward on the main Copper River, or eastward on the Chittenah, navigation will be attended only by the obstacles everywhere encountered in streams having a rapid fall and overloaded with gravel.

The first, and up to the present time the only, information concerning the pass between the Copper and the White River basins was obtained by the 1891 Schwatka expedition, of which the writer was a member. Considerable information as to the possibility of navigating the Copper River from Taral to the coast, additional to that obtained by Abercrombie and Allen, was also obtained, and most of this has never been published.

The '91 expedition reached Ft. Selkirk, at the confluence of the Pelly and Lewes rivers, via the Taku River, Lake Ahklen, and the Teslin and Lewes rivers. At Ft. Selkirk we secured native packers, who professed to be familiar with the country, and agreed to go with us to the home of the Scolai, on the Copper River. We proceeded overland in a general southwesterly direction, parallel to the main axis of the White River basin, and crossing its numerous southern tributaries. When we reached the northern edge of the Coast, or St. Elias, range, the natives refused to accompany us further, and the party, Lieutenant Schwatka, Mark Russell and the writer, determined to continue alone. We followed the northern base of the St. Elias Mountains some distance westward, and finally discovered a low pass by which we reached the east branch of the Copper River, and thus made our way to the coast.

While the obstacles of navigation outlined above and the nature of the passes will doubtless prevent this from becoming a thoroughfare to the Yukon, the river must still form the chief means of access to a large territory, and one which probably needs only a thorough prospecting to reveal great mineral wealth. It certainly

XUM

contains copper, both native and in its various ores, possibly in large amount, and the indications that it contains gold are also good. If the difficulties to be encountered are foreseen and provided for in advance, there should be no great hardship in reaching any part of the Copper River basin.

Finally, a word as to the natives. Much has been said in the papers concerning their treachery and bloodthirstiness. They have had a bad name since the killing of Seréberinikoff, in 1847, but that worthy doubtless merited the fate which he met. The fact that the Indians themselves reported his death and returned his effects to the Russian post is much to their credit. So far as we could judge from ten days' intimate intercourse with them, they are thoroughly trustworthy and honest. They are very much superior to the Pelly and White River Indians in their physique, manner of living and moral standards. Nicolai, the chief of the Taral Indians, is a man of much force of character, and that he is a shrewd trader is nothing to his discredit. It is safe to say that any one going into this country will have nothing whatever to fear from these natives so long as he deals fairly by them. It may be said in their favor that they would probably resent any serious injustice or imposition upon their good nature.

C. WILLARD HAYES.

DECEMBER, 1897.

# SOME OBSERVATIONS ON PRISONS IN VLADIVOSTOCK AND SAKHALIN.

AN ADDRESS BY

BENJAMIN HOWARD, M.A., M.D.

MR. PRESIDENT, LADIES AND GENTLEMEN :

I feel very grateful, naturally, for the very kind remarks by which I have been introduced to you. Allow me to say that coming from one whose apt eloquence on international occasions has won for him the admiration, the respect and the attention of geographers throughout Europe, and who has also commanded for every member of the American Geographical Society a certainty of cordial welcome on all international occasions, I am very grateful.

I see, by the card, that I am expected to deliver a *lecture* on the subject in question. To lessen your forthcoming disappointment I ask you to expect only a little talk from an old neighbor and friend, who, although he has visited Russia four times up to this moment, has never even sent a letter to a newspaper on this topic. So you will understand that this is purely a confidential talk to old friends and neighbors.

It is an extremely difficult thing for the people of any one country to form a fair judgment or estimate of other countries, and especially of the penal system of any country; that penal system having been evolved out of conditions of which you yourselves have no experience. Consequently, I have taken very great pains in my studies of penal questions first of all, as quickly as I could, to understand the people. In this way I have found what I think you will find, if you choose to prove it, that if you want to understand the genius of a people the place where you will learn it is rather in the prisons than in the palaces.

I will ask your attention to one preliminary remark.

In connection with what I have just now said about our forming a fair estimate of the penal system of another country, I would suggest that you try to remind yourselves of the nature of Russian civilization. It is most difficult, when we think for a moment of the present position of Russia among the nations, to imagine that only eight or nine centuries ago the Emperor of Russia was a heathen, notorious for his human sacrifices to his heathen gods. It is difficult for us to imagine that less than two hundred years ago



XUM

the very ground on which the Russian capital now stands did not belong to Russia.

Although we find most wonderful culture, intelligence and learning in Russia, and everybody who has met Russians has remarked their courtesy, their finish and their remarkably correct pronunciation of any language, still it is only fair to say that those individuals are much like the silver and gold that we find in silver and gold mines: it runs only in streaks and in pockets. For the rest of the people we will not say much.

One of the greatest difficulties in the way of progress in the Russian Empire was the nomadic habits of the people. As you know, they were mostly Tartars; those who were not Tartars were Goths. And during the early part of its history the entire area of Russia was so overrun by Tartar tribes that, like the waves of the sea tossing to and fro, army was marching against army, tribe against tribe, with inevitable bloodshed, and such famine as has never been heard of in history, out of China.

The first time there was any cessation of this bloody strife was when Ivan the Terrible managed to meet these Tartars with firearms. That gave them a shock from which they recoiled, and fled toward Siberia. The next step in the progress of Russia was when Boris Godunoff introduced by an edict the institution of serfdom on the 25th day of November, 1597. He issued an edict that every peasant should thereafter belong to the soil on which he was found on that date. Much as it may go against our general feeling to consider this idea of serfdom, undoubtedly it was one of the most important steps in the commencement of real progress in Russia.

Now, about this time Yermak discovered Siberia, and the great question became, "How to populate Siberia?", because that immense area was only a geographical expression. "How shall we colonize that country?" Emigrants could not be sent from Russia, the men being bound to the soil. They were serfs. That edict did not cross the Urals. There has never been a serf in all Siberia. From whence, then, should this population come? This problem confronted Peter the Great and he began to send his prisoners of war there, Swedish, Norwegian and others at first, and afterwards criminals were sent. One of the problems before the Government, and a great objective point to be attained, has been the productive, solid colonization of Siberia. Remembering this, it may be supposed that when a magistrate sends a man to Siberia he feels that he has done something for his country, knowing, as he does, that the very best land in the Russian Empire is that of the middle regions of Siberia. The exiles, none the less, try to escape.

Between 1871 and 1876, for example, from one province alone, over five thousand exiles escaped, or attempted to escape. It costs a good deal to send an exile to Siberia, and if you have then to hunt him up and put him back, it is a very costly matter, and there are, besides, the immense army and the posts needed on the border. The remedy that seemed to suggest itself for this great expense was to have some great out-of-door prison from which nobody could escape, and the Russians thought of Sakhalin, the island of which I am going to speak to you.

Although the old Tartar nomadic feeling is strong among the Russian masses, still they have a superstitious dread of distances. If you should go among a crowd at the piers of St. Petersburg you would not ask in reference to a stranger, "How much has he got?" but "How far?" Tell me how many versts a man has been condemned to, and I will tell you his crime; at least I will tell you the verdict. If it is a mild crime, it may be simply to Tomsk, for a year, or two or three years. If it is a worse crime it may be two or three thousand miles further. If more, still further. So it is continually going beyond, and beyond, and beyond. The part I will show is where we come to what may be called getting behind the *beyond.*

It is very common among my friends, to ask of me, "Now tell me, is it really all true, those horrible things that are told us about Siberia?" Well, now you see if I were to attempt to answer that, it would take me a hundred years to find out all about those horrible things, and I can't say "No" or "Yes," because it would take me just as long a time to become competent. The most I can say is "That it is possible." But I am quite at liberty, and that is what I am going to do to-night, to tell you some things I know. Not because I wish you to accept my view—I have no view—but because in this way I contribute a personal part; just as if you want a truthful picture of any one man it is better for you to have a great many, forming a composite picture, and as you gather experiences in that way, of a great number of people, without the trouble of going yourself, you may arrive at some tolerably fair conclusion. But you must not be surprised if nearly everybody gets a different impression wherever he goes, from that which he sees; the very best results to most of us in foreign travel anywhere are really subjective just as much as objective.

My attention had been called to Sakhalin and I was anxious to know whether there were any political exiles there; call them "reformers" if you like.

XUM

I saw an official letter, No. 2926, and it gave a long list of political exiles; and the letter stated that no distinction must be made between them and other convicts. That is precisely the most difficult and painful part of the political exile question. There is such an immense difference between the lower orders of Russia and any man of education, that that is frequently one of the most painful parts of the situation of the exiles. Instances were reported in a newspaper of merciless beatings and cannibalism, and I read the name of a certain official who would first starve and then shoot the convicts, and state that the deaths were through disease.

I thought that somebody ought to know about this place, and though it was said to be impossible to get there, I thought I would try it. Most writers on Siberia have stopped short of the Pacific. Kennan got as far as Irkutsk, and there turned back. Lansdell got as far as Yakutsk; he tried to go as far as he could.

Further east is Vladivostock, the terminus of the Trans-Siberian railroad; and beyond this lies Sakhalin, the place of which I speak. When it was first instituted the people sent there were murderers, double murderers, heads of gangs of assassins, and political culprits who were held to be of equal criminality. I had the good fortune to get there at a time when the population was simply at its worst. This island, you see, is about from 45 to 54 degrees north latitude, and is bisected by about the 142d degree of east longitude.

When I arrived at Vladivostock I at once called upon the Prefect, handed my card, showed my passport, etc., and the same evening, while I was at dinner, he was kind enough to come and join me. Well, he was amiable; I tried to make him so. He said he was very much astonished; he could not understand it. Whatever could I be doing; why should I come out all this distance?, etc. I gave a great many explanations, and he thought I must be an extremely rich man, and all that sort of thing, and then he said, as he was going away, "What can I do for you?" "Well," I said, "that's very kind of you. You can't do much for me." "Well," he said, "what would you like?" "Well," I said, "you see what I am after; I am trying to go and explore the Island of Yezo." (This is the most northern island of Japan.) "It seems to me that the only way, according to the map, is to strike Sakhalin, and then cross the strait of La Perouse, and land off Cape Soya; then on that very volcanic island, which so far as I know has not been traversed, I intend to travel from the north to Hakodate. If you can help me to Sakhalin——" "Oh, no. The fact is that it is a name; you know that there is a certain place which we don't mention very often, ex-

cept when we are very angry perhaps, and Sakhalin is just such a place. I have heard a convict say to another, who had been sent to Sakhalin, that he had gone to the Isle of the Damned."

He said, "Would you care to see the prison?" "Oh, I have no objection; yes, if you like." I never exhibited any special desire to see what I was there for. So at last I consented to go to the prison. It was like most of those prisons—a huge stockade, with a great, heavy log gate, on entering which you are surrounded on all sides by the big outer court, with *cameras* (sheds), you would call them barracks. Not much of the prison idea, such as we understand by "prison." In there and in the various cameras were two or three hundred men standing about. They were smoking, those who wanted to, and talking; if they wanted anything to eat which was not furnished by the authorities, anybody was allowed to give it to them from the outside, handing it through the gate. The most troublesome part, the worst part, is the absence of occupation.

The fact is that the larger number there were under arrest and had been awaiting trial, and that is one of the sad features in these prisons,—the long time before a man can get a trial. It all grows out of the passport question. Nearly everybody who was there was one who had some other man's passport, or who had none.

The Prefect said: "Now go, wherever you like; no hesitation. I will stand away; go off somewhere, talk to anybody, say what you like."

I went through the various cameras and then among the men. My friend said: "I'll tell you one thing in advance. You will find that the men have not done anything wrong, and they would like to know what they were there for." Well, I found that that statement was true. Then he said: "I will point out some men who talk French and German; perhaps that will be easier for you." He did so. I was talking to one man in French, and he told me a most sad story.

He had escaped, and was fifteen months going through the forests. At last he reached Vladivostock, and succeeded in what they like better than all. He succeeded in getting on an American ship, and he thought he was safe. He packed himself in amongst the cargo. The vessel was to sail in about three hours, and when three miles away of course he would have been free forever.

Suddenly he felt a tug at his right boot. He had not had the slightest idea of it, but his right foot was sticking out, and the man who was tugging at it was a policeman, making his final search of the ship before it sailed.

XUM

I went after that to the first village. It is up the road and around the hills about three miles. That is a village entirely for exiles, and as I like always on such occasions to go quite alone and drop in unexpectedly, I visited most of the cottages.

In Vladivostock I talked of nothing but the exploration of Yezo, and it got about in the Marine Club that I was some sort of a wonderful explorer. I could not help that. I did not call myself an explorer, but as an explorer they gave me a dinner at the Club, and there sitting nearly opposite me was a magnificent looking officer in full regimentals. I told him what I wished to do. He said: "But do you think you dare try?" I said, "I don't know; I have crossed the English Channel in an open rowboat, and I think I can visit La Perouse Strait."

He said nobody was allowed to go to Sakhalin. In the first place, there is no means of getting there, and then nobody would be allowed to land if he did get there, because the sentinels would stop him, and he must have a special passport from the Governor, and then if I did get ashore there is no such thing as a tavern or a bed or a store on the entire island. "What would you do?" I said, "I don't know what I would do, except that I had always found the Russians a very hospitable people," etc. Well, the dinner went on and he became wonderfully amiable, and insisted, as he had only finished his holiday (he had been away for a month), and was going back to-morrow or the next day, that I must go with him and stay with him all summer—as long as I liked. "To tell the truth, we are as badly off as the exiles themselves," said he. "There is very little difference between us, and if you will only come it will be a benefaction to us all. We shall all thank you for it."

If I had hesitated a moment the door would have been completely shut against me. The best things that come to the traveller are the unexpected, and if you wish to be successful as a traveller you must seize any opportunity which happens to turn up.

With true Russian punctuality, instead of starting to-morrow morning, he started the day after to-morrow morning.

It took us about three days and a half to reach Sakhalin. When we arrived I had a very beautiful experience. Just as we were approaching these straits, at dawn, I noticed an island which looked like a monument. It is about ten miles around, and from every side, in curves of the most beautiful description, it rises from the extreme base to the apex, not like a pyramid, but with a beautiful sweep of curves, six thousand feet. Under the morning

mists and then with the disappearance of the mists, and in the different atmospheres through the day, it was surprising how beautiful were the effects, and as sunset approached the mists around were deepening and the colors becoming more and more rosy and then gorgeously red. Just as the sun was going down the full moon came up. One side of this mountain was suffused with the rosy blush of the sunset, the other side colored with the white light of the moon, and as the sun went down and the moon rose up and up, the lights crossed and the flush cooled and then faded away until it seemed like a human blush, and then down and down, whiter and whiter as the moon rose, it came to be as white as snow.

My first revelation of the peculiarities of Sakhalin occurred the day after this. I was on deck and I said to the first mate, "What a remarkably good boatswain that is you have got. He seems to look so well after the men." He said, "Come here." I went with him to the other side of the deck. "Now," said he, "you must not tell anybody about this secret, but that man is a murderer; they are all murderers, but," he said, "a better man I don't wish to have. The other men know what sort of a man he is, and I assure you they know how to keep their places, and I have no trouble with any of them."

The Government boat was manned in that way, and then I saw the reason for what I had hardly noticed before, that the gangways were all guarded by sentinels.

Well, we arrived after three days and a half at Korsakoff.

The one thing that strikes you as you get further and further north in those regions is the silence and the absence of life. Here is a large bay, but it has not a sign of life. Here are buildings running up the hill to the top.

We landed, and just here the officers were awaiting us. The Governor invited several friends to come up to dinner. We had just had dinner on the boat, but that does not matter in Russia.

During the general talk among the officers, I noticed that there was a considerable sensation, and asked what had happened. "Well, only five of the worst men escaped last night, and it is impossible to know what road to travel, or what may happen."

The Governor's house was all of wooden logs, very thick—a house like a fort. A room, very large and comfortable, was the Governor's bureau, private room, etc., and was assigned to me. In one corner was a very suggestive thing, a table piled up with letters, loving messages from different parts of Russia, never delivered and messages also from here which had never been delivered. These

XUM

letters were being inspected, and nobody could tell which would be delivered and which not.

Well, these five men had escaped, and it was said their favorite revenge was fire, and that it was impossible to know what would happen.

When the Governor said "Good night," he brought pistols and laid them close beside me, and then a walking stick, made to look like an old-fashioned battle-axe, such as Ivan the Terrible had, and he set that down. "Now," he said, "it's all right." I did not say a word. He did not know that I knew of the escape, but he said "Don't hesitate. Au revoir," and went away.

I felt rather uncomfortable when he said that on no occasion was I to open one of the heavy barred windows. I said I would not. After awhile, I suppose about two o'clock in the morning, I heard *clank, clank*, outside. I must say I was very, very anxious indeed, but nothing happened and the next morning I was told that it was probably the guard. At day-break—you could hardly see day-break on account of the shutters—one of the ugliest looking women I ever saw crept in with a cup of tea that is always given in Asia very early in the morning;—and she was a *murderess*. I went to the little tent outside to have breakfast, and a man came up behind me and reached over my shoulder, and he was a murderer. Then when we rode out after breakfast, a man, with magnificent broad shoulders and splendid face, drove, and he was a murderer. The fact is, strange as it may seem, they have no choice; all the domestics must come from the material they have, and if you take a thief, he is almost always sure to stay a thief, while a murderer may be a very nice kind of a person. They did that kind of thing among themselves and I don't want any better men than some of those that were sent there for murder.

The Governor said, "Now then, I'll tell you what I propose to do. You see I am just back. Everything is out of order. Now it will take me a long time to catch up; I have got to inspect everything. We have got forty-four horses in the stable, a steam pinnace, launch boat, and we will have to inspect everything, and I want you to go with me if you have no objection." That was just what I wanted.

Well, it is a peculiar thing to be in a country under such circumstances. The silence, everywhere we went, for example, was a striking thing. There was not a bird except a throstle, and that had no song; there was not a flower that had any fragrance; there was not a fruit that had any sweetness.

The fish at Sakhalin were very remarkable. It may seem strange but it is true, that standing at the dock, it seems impossible to drop a stone without killing a large number, or dip a net without pulling it up full.

The prisoners serve two years in prison. The first question asked is, "What can you do?" and then the prisoner is put at anything he is best capable of doing—lodging in the prison.

If he is capable of work in the prison, it may be carpentry, etc.

At the end of his two years, or perhaps less, he is told he can go out and still work in the prison or otherwise, but he is helped until he can maintain himself.

If he is a farmer, and understands agriculture at all, he is sent out to one of the thirteen agricultural villages. He is given a new modern cottage, or an old one, and he is allowed a certain amount of money. He has an ox, and if he requires it, a horse, a team and all sorts of seed and rations to subsist on, until he can get his crop.

The essential idea is to direct the men into self-maintenance just as soon as possible.

The prison stands opposite the Governor's house.

You find a number of large yards, and these barracks or modern houses around each yard.

In all that large prison there were only three cells, all large rooms. The Russians are a gregarious people, flocking together. They do practically what they like in prison—they smoke and go out in gangs to work. The three cells I saw were occupied by the most distinguished prisoners, and it is considered a sort of a special favor to occupy them. Two of them were occupied by princes, and were fitted up about as well as the quarters of an ordinary captain.

I made my observatory of the hospital, because, as I have said before, in a prison you can study the genius of the people, but if you get into the hospital then you know that nothing goes on but what it comes to the hospital sooner or later, and if there has been any damage, whatever it may be, it has to come to the hospital; if it is disease from over-feeding, or under-feeding, or if a man has been flogged, it has to come to the hospital.

We made our inspection that day of the dog-house; they had hundreds of dogs, because in winter the only way of travelling is by dog sleds. They have to keep them of course, hundreds of them, all summer.

I have seen the prisoners going in gangs from the prison to their work, and they seemed fairly well off—tolerably well clothed. Outside of the coal mines they may be seen resting themselves.

XUM

The mines are not like English coal mines, which have very deep pits, but are all surface mines.

In and about the church, on Sunday mornings, there are groups of the free. No prisoner is allowed to go there. The priests told me that they never had anything to do with the people in the prison; which is a great, sad defect. Here it is just as in any village church, and the place is quite full. Inside the church you find the Governor and the military, all on a par, all kneeling together, except that for the ladies there is perhaps a strip of carpet (you know there is much genuflection in the Greek service), and it is a most interesting sight. In the Greek church a great deal of the service is done by laymen. The layman in this case, a capital reader, was a murderer. The choir also, splendid singers, were murderers.

One thing was very pathetic: almost every woman, and some of the men, had on something or other which, you could see, had been brought all those thousands of miles—something which belonged to and reminded them of the place from which they came; it might be a little handkerchief, a kerchief, a little ribbon—but something peculiar, and one who knew the provinces of Russia could always tell where the wearer came from.

After I had seen them worshipping so earnestly, I could not help it; I was one of them and we were all worshipping together, and I have not the slightest doubt, that whether they were murderers or not, if strangers could see such a congregation, they would ask themselves, as I asked, is it not better, would it not be better, that all these convicts should be worshipping together, than that they should have been hanged?

There is no provision for education; that is voluntary. The Governor's wife takes charge of the matter and the school is supported partly at her expense and partly by contribution from others. But I have never heard of much money being spent.

The commonest punishment of the criminal is to shave half his head and chain him to a wheelbarrow. It is a long chain and gives him plenty of tether, but he has got to take his barrow with him, or he cannot go at all.

Flogging by the knout has been prohibited in Siberia. It is allowed only on this island of Sakhalin, and for murder. No Russian civilian is allowed to witness an execution of that sort; certainly no traveller. You can look over any book you like, even any romance you like, and I think you will find that no author ventures to say that he himself saw a case of flogging.

Although the Governor and I were so intimate, I noticed for the

first time one day a little constraint in him. I met the doctor, and said, "You do not look very well." "Well," he said, "I am very unhappy. There is a case which has come into court for flogging for murder, and I don't like it."

It was not a thing that I would like to see, but I thought that somebody who was competent should know what this flogging by the knout was, and however painful it might be to myself I had better see it for the purpose of truth. I saw very well that the Governor was keeping something from me. Here comes the advantage of being a doctor. The prison doctor went to the Governor and said that the prisoner's case was so critical, that he could not take the responsibility of deciding whether he was fitted for the punishment, at the examination which must take place four hours before, and he asked that I might come in consultation with him. The Governor could not refuse, and I did it. I afterwards went and saw the flogging. It took place in the great yard of the prison, in the presence of the Governor, the surgeon and myself. The criminal was stretched out on a table in the middle of the yard, and behind him stood the executioner. To the right of the table and at a good distance was the man who kept the tally, and counted aloud each blow as it fell: one, two, three, and so to the end.

I have never seen anything which was so painful to witness. The knout has a large thick handle, the strands of the whip are divided into three by knots, and with a hard end, and the scourge descends like a bird of prey, and picks out the piece.

The only pleasant thing about it is the end. As soon as it was over, and the man was not dead, he was taken to the hospital, and the doctor, who was one of the best of men, cared for him just as much as if he had been a sick woman in New York.

Punishment of this kind is unusual. The result of my observations in Siberia and Sakhalin is this: However bad the whole system may be, the Russians have a genius for mild administration. You will see that all through there is one idea, colonization, the utilization of criminals and political exiles for the highest good of the state. I think that this is a lesson that we might learn in our own prisons.

After we left Sakhalin, we had a most wonderful display of phosphorescence. About midnight we were struck by a typhoon, and such was the light, as the waters rushed in upon us, that every flake of foam was like the striking of a match, and the splendour was so great that you could see every face the whole length of the deck, and the whole outline of the ship. It was like being in the midst

of fire. It was so magnificent that we seemed to be in another world.

Our ship went to pieces and we were five hours in the water. At last we got to an island where we built a raft, and were picked up by a vessel bound for Japan.

On the way we encountered another typhoon, the one in which the Turkish man-of-war *Ertogrul* went down with some 600 men, who had just received special signs of favor from the Emperor of Japan.

## WASHINGTON LETTER.

WASHINGTON, D. C., APRIL 15, 1898.

The principal topics which may be considered as of geographic interest in Washington have been, first, and primarily, the all-absorbing question of Cuban affairs. This has pushed into the background the otherwise weighty matter of surveys and explorations of Alaska—the land of ice and gold. The public, also, has almost lost sight of the controversy over the future of the forest reserves, and apparently is ignorant of the attempts being made by interested parties to secure the nullification of the President's proclamation.

CUBA.—The reports of the consular officers lately resident in Cuba have at last been made public in response to resolutions adopted by Congress. These papers, held back for State reasons, have been made accessible to all citizens, and the facts of the indescribable suffering and wholesale death by starvation are related in the pages usually devoted to statistics of trade or the condition of special industries. These reports embrace communications from consuls at Matanzas, Santiago de Cuba, Sagua la Grande and other points. The more startling or distressing facts contained in them have been by this time diffused through the public press and the estimates as to the enormous decrease in population through starvation and pestilence have been many times repeated.

The efforts of various departments of the Government at Washington to secure correct geographic information concerning the island have brought out strongly the general lack of precise information. It has been possible to compile maps covered with names, presumably those of settlements, and with a network of lines indicating means of communication, but as to whether these roads are passable even by means of pack animals is a matter concerning which there appears to be much doubt and uncertainty, and it seems highly probable, from the reports of persons who have recently penetrated the interior, that many of the places named have no local application, there being possibly no resident in the neighborhood.

SURVEYS OF ALASKA.—On April 5 the U. S. gunboat *Wheeling* left Seattle, Washington, carrying the surveying parties who will



XUM

begin the first systematic mapping of the interior of Alaska. It is proposed to inaugurate work similar to that which has been so successfully begun in various parts of the United States. Topographic maps will be prepared showing the absolute elevations by means of contour lines located at intervals of 100 or 200 feet vertically, and referred to sea-level or some datum point whose altitude will be ultimately ascertained. The scale of mapping will probably be 1 to 90,000, with the idea of final publication on a scale of 1 to 250,000, or about four miles to an inch. While the topographic mapping is being carried on a thorough study of the rock structure of the country will be made, and especial attention given to the mineral resources, particularly gold and coal.

The general direction of the field parties has been entrusted to Mr. George H. Eldridge, an experienced geologist. On reaching Alaska the parties will be separated, and, as necessitated by the nature of the work, will proceed to a certain extent independently, rendezvousing about September 15 at St. Michaels, in order to return to the United States. Besides Mr. Eldridge, the geologic field work will be carried on by Mr. Arthur Keith, Mr. J. Edward Spurr and Mr. Alfred H. Brooks. The topographic mapping is to be done by Mr. Edward C. Barnard, Mr. William J. Peters, Mr. Robert Muldrow and Mr. William S. Post. These regular officers of the Geological Survey are assisted by a small force of picked men, whose reliability and endurance has been tested by many years of service in the rougher parts of the United States.

On arriving at Skagway, it is planned to drop Mr. Barnard with his assistants. This small party will proceed to the Klondike region by the most accessible route and from there down the Yukon to the international boundary between British Columbia and Alaska. On reaching this locality, work will be begun on the topographic map of the area lying immediately to the west of the 141st meridian and adjacent to the Yukon.

The party under charge of Mr. Barnard will be accompanied as far as the upper ramparts of the Yukon south of the Klondike region by a second party, in which Mr. Spurr will have charge of the geologic work and Mr. Post of the topographic. On reaching the vicinity of the Klondike region, this second party will turn back southerly up the White River for the purpose of exploring this stream, especially that portion west of the international boundary and south of the area to be mapped by Mr. Barnard. Crossing over the divide at the head of White River, it is probable that they will proceed northwesterly down the Tanana, which flows in a gen-

eral way parallel to the upper part of the Yukon and enters this stream near St. James Mission.

Leaving the parties at Skagway, the main expedition will continue to Cook Inlet and up to the mouth of Sushitna River, which enters near the head of the inlet. Proceeding northerly up this river, it is proposed to reach a point at about the latitude of Fort St. Michael, where it is reported that several forks of the river unite. At this point Mr. Peters, topographer, with Mr. Brooks, assistant geologist, will leave the main party and proceed northeasterly into the country between the Copper River and the Tanana, connecting their traverse map with that made by the party under the direction of Mr. Spurr. The remainder of the force under Mr. Eldridge will proceed westward to the headwaters of the Kuskokwim and continue down that stream to the point where it approaches the lower Yukon and passing over the usual portage they will join the others at St. Michaels.

In addition to the Survey parties mentioned other expeditions have been sent out by the War Department. One of these, under Capt. B. Eldridge, is expected to explore the region near the Dalton trail or to the west on American soil. Two other parties are intended for Copper River and Cook Inlet, accompanying which are two assistant geologists, Walter C. Mendenhall and T. C. Schrader. At the same time the channels at the mouth of the Yukon are to be sounded by parties sent out by the Coast and Geodetic Survey. Thus it is expected by the end of the season to obtain fairly complete information concerning the accessibility to the interior by the various mountain passes and principal waterways. Coöperation has been established among various bureaux of the Government, by which a combined attack from different directions is being made upon the almost unknown areas. With the fairly accurate information thus obtained, the development of the natural resources of Alaska is in a fair way toward realization, and with the disappearance of the cloud of doubt and uncertainty which has surrounded this vast interior country there must result the destruction of many of the hazardous or even fraudulent speculative schemes now too prominently forced upon the attention of the public.

Forest Reservations.—The surveys of the Forest Reservations, to which reference has frequently been made, are adding to the knowledge of the least known parts of the United States both as to position of topographic features and to resources in timber, in grazing and less directly in mineral wealth. The Reservations

themselves are apparently in a somewhat insecure position, as attempts have been made by the Western Senators to nullify those recently proclaimed by President Cleveland. By act of Congress, approved June 4, 1897, surveys and examinations of the Reservations were begun and carried on as rapidly as possible during the remainder of that year. Further work has been suspended during the winter, but is to be renewed as soon as the melting of the snow in the mountains will permit access to the various areas. Without waiting, however, for the results of these surveys or for changes or modifications that may be made in the boundaries of the Reservations, the Senate, at the instance of some of the Western members, has attempted to indefinitely suspend the operation of the President's proclamation and to restore to the public domain the areas thus set aside. Considerable interest has been aroused in the matter, as there is apparently a growing belief both East and West in the desirability and even necessity of setting aside the vast tracts of land, mountainous in character, valueless for farming purposes and of use mainly for the production of trees. The withholding of these lands, it is believed, will be of great benefit to the development of the country and cannot work injury to any legitimate occupation, since mining is permitted and lands which are capable of being tilled are excluded.

A somewhat detailed report of the forest reserves has recently been made by Mr. Gifford Pinchot, a professional forester, formerly connected with the management of the timber properties of the Vanderbilt estate at Biltmore, North Carolina. In this he shows that by far the greater part of the reserves is covered with growing trees. The areas, however, include considerable tracts which have been stripped by occasional fires. In general it is probable that most of the forests throughout the country have been burned and have grown again during recent geologic periods. Given time enough, there is little doubt but that this process of natural reforestation will be repeated on the lands now devastated. On all sides successive steps in the return of burnt areas to fertility may be observed. Such lands will resume their former character if the increasing fires due to the presence of man can be checked.

The lands included within the reserves are for the most part capable of producing forests and may with propriety be held for this purpose. In comparison with the danger from fire, the loss to the national timber lands from cutting is almost insignificant. On the other hand, it may be said that under the present system of getting out timber, fire is almost sure to follow the logger. With the

progress of settlement the loss or useless waste by fire is increasing with geometrical progression. The time required for new growth upon the burnt lands is long when compared with human life, and in general it may be said that at least a century must elapse before merchantable timber can be obtained.

The protection of timber is, however, not the sole reason for making the reserves. According to Mr. Pinchot, the forests have a favorable influence upon water-supply, performing in this respect a double function; on the one hand they serve to maintain the flow of water in the streams during times of drought, and on the other hand they are a powerful agency for the prevention of destructive floods.

The report of Mr. Pinchot, prepared for the use of the Secretary of the Interior, dwells particularly upon questions of administration—a matter which, though well worked out in several countries in Europe, has received little or no attention in the United States. It is urged that, in place of our characteristic American method of administering public affairs through political appointees, a corps of technically trained forest officers be created. The peculiar responsibilities placed upon the forestry officials demand a high standard of fidelity, honesty and ability, in addition to technical skill. To illustrate the dangers arising from the employment of men not possessing these qualifications, there has been cited the temptation to loose management, as in the matter of over-cutting. To cut too freely may involve the ultimate impoverishment and destruction of the forest. While the cutting is going on it may add greatly to the popularity of the forest officer and perhaps to his professional reputation for getting good supplies of timber and large money returns. If he be appointed for a limited term, as for four years, he may succeed in stripping the forest, and the results of his mismanagement not appear for years. The only safeguard against such danger is to be found in the creation of the professional spirit which results from a thorough training and devotion to a lifelong occupation.

The importance of beginning right in forest management is one which can scarcely be overestimated, since precedents or traditions are rapidly acquired and soon determine the character of the service. The confidence and good will of the local populations are essential and at the beginning are easily won or lost.

It is recommended that under a chief forester for all of the reserves and aided by one general inspector, there be 7 forest rangers, each of whom should reside in or near the reserves and

XUM

should be held responsible for proper conduct of the work. These should make frequent inspections, keep necessary books and accounts, issue permits for use of timber, and attend to general business management. They should be assisted by 20 forest guards, who should act as patrols, seeing that the rules and regulations are strictly performed and guarding against injury from fires.

In addition to this body of men, relatively insignificant when the vast extent of the public forests is borne in mind, there is suggested the employment of 165 fire watchers, to be paid from $25 to $50 per year, on condition that they bind themselves to repair with all practicable speed to every fire occurring within assigned limits, and use all efforts to extinguish it. The creation of a body of men pledged to prevent fires and to assist in fighting them is believed to be entirely practicable under the existing conditions. Although the amount of pay in each case is small, yet ready money is so scarce among the owners of the small ranches adjacent to the forest reserves that the inducement to earn even this sum is sufficiently great to insure reasonable promptness and care. It is estimated that the total expenditure for all employees will not amount to more than $45,000 per year, and, with the $25,000 additional for miscellaneous expenses, the total will amount to $70,000; an exceedingly modest annual appropriation, in comparison with the benefits, since the annual forest fires have often consumed timber whose value may reach to millions of dollars and whose indirect damages may be even greater.

The object of the forest operations in any reserve should be to harvest the largest amount of timber consistent with steady improvement in the value and usefulness of the forest. The details of the work must be dependent upon the requirements of each individual case. Lumbering operations should not be undertaken by the Government, but the function of the forest officers restricted to the selection of trees to be cut, their sale at public auction, and the enforcement of rules governing their felling and removal. All regulations should be directed in the line of safety from fire, continued reproduction of the forest, with improvements in composition and yield, the filling of local needs for forest products, and lastly, a fair return in money to the Government. The application of such principles must lead to widely diverse results in different forests. In some places nothing but protection from fire can be done for many years; elsewhere mature trees may be removed, while in other places the timber needed for near-by consumption can be taken with advantage to the forest.

The thorough system above outlined is still a matter dependent for its ultimate realization upon the education of our citizens in the resources and needs of the great West. Immediate personal gain and private interest are crying loudly against the broad policy of holding for the future anything which can be in part enjoyed at present. The firing of a mountain side covered with magnificent forest to afford a tourist entertainment for a single hour is apparently, in the minds of many, a more sensible proceeding than protecting the timber for the uses and needs of the unknown settlers who may gradually come in during succeeding years. License to take and destroy both timber and game is demanded as the right of the individual who is sufficiently adventurous to penetrate to regions beyond the lands now in private ownership. It is only by pointing to the struggles of citizens of the Eastern States in slowly restoring in part their wasted forests that our people can be brought to appreciate the necessity of foresight and of protecting the perishable resources of the West.

Floods in the Mississippi Valley.—The prevailing high water in the Ohio and Mississippi Valleys has, to a slight extent, renewed the alarm felt last year at the apparently increasing destructiveness of the floods along our great artery of internal commerce, and has called public attention to the studies which have been and are being made of the regimen of the river. These are founded on careful geographic research, or what may more properly be termed hydrographic investigations. The latest, and one of the most notable contributions to knowledge, is the report just printed, prepared by Capt. Hiram M. Chittenden, of the Corps of Engineers, U. S. A. The work was undertaken in conformity with a clause contained in the River and Harbor Act of June 3, 1896, providing for the examination of sites, and report upon the practicability and desirability of constructing reservoirs for the storage and utilization of water; to prevent floods and overflows, erosion of river banks, and breaking of levees. The further stipulation was given that one reservoir site at least should be surveyed in each of the States of Wyoming and Colorado.

After a broad study of the whole subject, the conclusion was drawn that it is perhaps physically practicable to build reservoirs of sufficient aggregate capacity on the watershed of any stream, even so large a river as the Mississippi, so as to exercise some influence in diminishing the height of floods. The great cost of such works, however, as compared with results to be expected, will

XUM

operate to prevent their construction unless the water thus held is needed for industrial purposes; in other words, the possible amelioration of flood conditions will not warrant the construction of great reservoirs, even if suitable localities for them existed. It is pointed out, moreover, that flood protection and industrial use are not entirely compatible objects. In order to hold the floods the reservoir should be kept emptied until needed, and should be again emptied as soon as possible, as local floods in a wet year may follow in quick succession. If used for industrial purposes, it is probable that not more than 50 per cent. of their capacity should be depended upon as reserve for flood storage.

One important geographic feature which the public at large does not appreciate is brought out clearly in this discussion. It is a common error to suppose that the great floods of the lower Mississippi come from the melting snows in the Rocky Mountains. As a matter of fact the floods of the Mississippi occur at seasons when the flow from the mountains is very small. At the time of the great flood of 1897, the Arkansas River contained practically no water in western Kansas, and the discharge of the Platte in Nebraska was relatively small. The destructive floods of the Mississippi are the result of heavy rains in the low region south or east of the Missouri. This stream, although it drains the largest catchment area, is not an important factor, the controlling element being the Ohio River.

The magnitude of the floods in the Lower Mississippi depends upon accidental combinations of storm-flow from many tributaries, no one of these, except the Ohio, being capable of producing serious consequences in the main river; but if, when the Ohio is high, several of the other tributaries discharge an excessive amount of water simultaneously into the main stream, great disasters are liable to follow. Fortunately, however, the flood waves from various directions usually arrive at different periods, and destructive combinations are infrequent.

It has been estimated that when the total discharge of the Mississippi at Cairo, above the bank-full stage, would cover an area of 8,500 square miles to a depth of 10 feet, to hold this would require reservoirs of an average of 10 feet in depth, and having an area equal to that of the State of Massachusetts, or about one-fifth the size of Ohio, Kentucky, or Tennessee. The topography of the headwaters of the Ohio and Upper Mississippi Rivers, while in a general way favorable for reservoir construction, is not of the character to permit the construction of storage work of this enormous

extent. On the Lower Mississippi, however, there are vast areas where, from the topographical standpoint, such storage of superfluous water might be had. The St. Francis Basin, lying along the river, has an overflowed area of 6,700 square miles. From head to foot this basin has a fall of 120 feet. It has been suggested by Mr. James A. Seddon, Assistant Engineer, U. S. A., that this might be divided by dikes into basins or compartments, distributing the slope of the basin in such a fashion that the compartments would succeed each other from north to south in a gradual descending series. The superfluous water stored in these basins could be gradually released, increasing the low-water flow and radically improving the navigation of the Mississippi from Helena to the sea. From this point, northerly, slack-water navigation could be provided through the basin by means of five or six locks suitably placed in the retaining dikes of the separate compartments.

The results of the surveys demonstrate that the construction of a general system of reservoirs in the arid region might cause an appreciable reduction in the flood height of the Missouri River during a June rise. This would not have any influence upon the destructive floods of the Mississippi, since these occur usually at an earlier date and originate from other causes. Although the reservoirs would thus be of little or no benefit to navigation, yet such works are indispensable to the development of the West through agriculture by irrigation. Private enterprise cannot successfully construct these great storage works, since under our present laws there is little or no security of ownership in waters thus held. As a public enterprise, however, the benefits both directly and indirectly must be largely in excess of the expenditures.

The geographical distribution of the flowing water, as it has been found day by day for a series of years at various points in the Mississippi River and its tributaries, is graphically shown by two plates prepared by Mr. James A. Seddon. These notable contributions to exact knowledge enable a person at a glance to grasp the combinations that make up the floods at Cairo, and also exhibit the progress of waters down the main stream. Beginning with the Missouri River at Sioux City, the daily fluctuations are shown throughout the years 1880–85 inclusive at this point, at Kansas City and at St. Charles near the mouth of the river. In the same way quantities at Prescott, Clayton and Grafton, on the upper Mississippi, are exhibited, at St. Louis, on the middle Mississippi, and at Paducah on the Ohio River; all of these being combined to make the total flow at Cairo.

XUM

Information of this character, giving our citizens correct knowledge of the geographical factors which limit or favor the development of the natural resources of the country, is of inestimable value in encouraging wise action or in preventing extravagant expenditure through erroneous impressions, such as those which have underlaid the popular demands for water storage in the arid region as the sure preventive of floods in the lower Mississippi.

GEOGRAPHIC NAMES.—The U. S. Board on Geographic Names, created September 4, 1890, has issued a pamphlet containing recent decisions up to January 1, 1898. This is supplemental to the first report printed in 1892, which contains 1,781 decisions. The recent report brings up the total number of decisions to nearly 4,000, or with county names up to over 6,700.

The Board was created in order that uniform usage in regard to geographic nomenclature and orthography might obtain throughout the Executive Departments of the Government, particularly upon maps and charts. It is constituted of departmental officers detailed from the various surveys or bureaux issuing maps and geographical publications. Its membership embraces ten persons, Mr. Henry Gannett, Chief Geographer of the U. S. Geological Survey, being chairman, and Mr. Marcus Baker, Cartographer of the same organization, secretary.

Among the decisions rendered are many of names concerning which there has been a long dispute. Two forms of the various spellings, Allegany and Allegheny, are given. The former is adopted for the town in Potter County, Pa., and the second for the river and mountains in the eastern United States. Cheyenne is taken as the official spelling of the river of South Dakota tributary to the Missouri, and not Sheyenne nor Shyenne, but the river of North Dakota tributary to the Red River is spelled Sheyenne. The now well-known starting point for the gold fields of Alaska is spelled Dyea. The highest known peak in the world is named Everest, and not Gaurisankar; while the well-known volcano of Japan is to be written Fujiyama, and not any one of the dozen or more forms which have been employed by different writers in the past.

There is a well-marked tendency to drop the word city as part of the name of the towns and villages so plentifully designated, especially throughout the West; for example, in Kansas, Garden City has been shortened to Garden, and Dodge City to Dodge. The principal city of Cuba is designated as Habana, and not Havana. The well-known narrow passage in East River, New York, retains

its familiar form of Hell Gate. The intermittent flowing river of eastern Colorado is correctly termed Purgatory and not Purgatoire, or, in the language of the cowboy, the Picket Wire. The creek and falls in the Catskills in Greene County, New York, has been definitely designated as Kaaterskill, while its neighbor in the same county is known as Plaaterskill. In writing about the gold fields of Alaska we are to use the word Klondike and not Clondyke or other combinations. The lake in British Columbia and the river in the same region and in portions of Montana is known as Kootenai, and the lake in northern Idaho is called Pend Oreille.

The familiar name of Grey Town, so often used in reference to the Nicaragua Canal, is replaced by the official designation, San Juan del Norte; while the seaport town of Egypt on the Red Sea appears as Suakin and not Sawakin nor Suakim. The Republic of South Africa is Transvaal and not the South African Republic. The well-known volcanic peak, the highest in sight from Puget Sound, is officially designated as Mt. Rainier, and, despite the earnest protests of the citizens of Tacoma, is no longer to be called Mt. Tacoma on the official maps. These and many other interesting decisions of general or local interest are to be found in the publication to which reference has been made. N.

## RECORD OF GEOGRAPHICAL PROGRESS.

### AMERICA.

CAUSES OF DISTRESS IN THE BRITISH WEST INDIES AND GUIANA.—Dr. D. Morris, Assistant Director of the Royal Gardens, Kew, wrote a long report upon the economic resources of the British West Indies and Guiana, the causes of whose distress were investigated recently by the West Indies Commission. His paper formed Appendix A of the Commission's Report, and on account of its importance it has been republished, and now appears as the first number of an additional series to the Kew *Bulletin* under the title of "A Report on the Agricultural Resources and Requirements of British Guiana and the West India Islands." His long studies in these regions and his intimate acquaintance with their conditions have enabled him to produce an accurate and impartial account of them. His report, of which *Nature* printed a summary (No. 1481), is a graphic illustration of the danger to any community of entire dependence upon one industry. This is a source of danger in several ways; commercially, because any large depreciation of prices involves the whole community in suffering; agriculturally, because bad seasons or hostile tariffs may at any time plunge the entire laboring population into great distress; and furthermore, the growth of one crop only sooner or later encourages the spread of disease and perhaps the ruin of industry.

These colonies have the area of Great Britain and Ireland, with the population of Wales. Little more than 2 per cent. of the entire area is under cultivation, and only 7 per cent. of the cultivable area. In fact, over twenty million acres are suitable for bearing crops, though only a million and a half acres are under cultivation. Guiana is the most valuable of these possessions. Its capabilities of development are almost unlimited, and yet it is one of the most distressed of the colonies. The inland districts are practically uninhabited, nine-tenths of the population clinging to the coast. The planters appear to regard every industry except sugar-growing as unworthy of their attention. Under the Dutch régime, previous to 1815, a great deal of coffee and cotton, as well as sugar, was raised, which proves that the soil is well adapted for other products, though now little is grown except sugar-cane. The soil is well adapted for rice, but it is not cultivated, and fifty million pounds

of rice are imported annually to feed the coolies of India, who compose a third of the population. The United States imports bananas to the value of $10,000,000, and yet British Guiana places no fruit on the market. It is observed that in the four essentially English islands of Barbados, Antigua, St. Kitts and Nevis, sugar is the only staple, while in the islands of Dominica, St. Lucia, St. Vincent, Grenada and Tobago, occupied by people who differ in language and customs from those of the other four islands, the cultivation of sugar has given place to cacao, coffee, spices and other products. Grenada is now quite independent of sugar.

Jamaica supplies a good illustration of the wisdom of selecting a variety of marketable commodities for cultivation in addition to the staple industry. In the early part of the century sugar was practically the only product for export, and this island suffered for a long time from partial crop failure or low prices before the idea was conceived of introducing other cultural industries. Jamaica still raises much sugar, but fruit has come to the front, and in addition large quantities of coffee, cacao, allspice, ginger, etc., are raised, so that the entire failure of the sugar crop would not be nearly so disastrous in its results as it would have been a quarter of a century ago. Dr. Morris does not propose anything that would tend to hasten the end of the great sugar industry, but he recognizes the need of supplementing the staple trade by a variety of other industries. He suggests the establishment of a department of economic botany and of agricultural instruction to promote the development of the resources of these islands.

Expeditions of the American Museum of Natural History.—The American Museum of Natural History has sent out two parties this spring to continue the ethnological studies that were in progress last year. Dr. Carl Lumholtz and an assistant have gone to Mexico, where Dr. Lumholtz had already made large collections for the Museum. The explorations this year will be confined to the northern part of Mexico, and the design is to elaborate the collections now in the Museum and fill them out where they are found wanting.

The other expedition, which will consist of Dr. Laufer and Messrs. Gerard Fowke, R. Dixon, and H. Smith, will spend a short time in British Columbia, but will devote most of its work to Alaska, particularly in the neighborhood of Bering Strait, where it will cross over to Asia and make investigations among the natives there. A number of Indians will act as guides and assist in collecting specimens, which will be shipped to this city as material for comparative

XUM

study. In Alaska and Asia the members of the party will live with the natives to gain a more intimate knowledge of their every-day life and pursuits.

THE GOLD FIELDS OF ALASKA.—The Geological Survey has met the great demand for information concerning the gold region of Alaska by issuing a pamphlet of 44 pages, with a large map showing the routes of travel and the distribution of the gold-bearing rocks in Alaska. The pamphlet is by Mr. S. F. Emmons, and its title is "Map of Alaska, showing known gold-bearing rocks, with descriptive text containing sketches of the geography, geology, and gold deposits and routes to the gold fields." The descriptive text is based upon Dr. Dall's paper on "Coal and Lignite of Alaska," in the Seventeenth Annual Report of Survey, Becker's "Reconnaissance of the Gold Fields of Southern Alaska," and the "Geology of the Yukon Gold District, Alaska," by Spurr, both of which appear in the Eighteenth Annual Report. The pamphlet contains a brief historical introduction, with a list of works giving information about Alaska. A geographical sketch of the region follows, with a description of the rivers, the climatic conditions, and the eight routes to the Klondike gold fields that have come into general notice. The last 28 pages are given to a geological sketch of the gold regions and those where coal, lignite and metals other than gold are found. The pamphlet will be most serviceable to all who are studying the mineral resources of Alaska and the neighboring Canadian territory, or who intend to go to the gold fields.

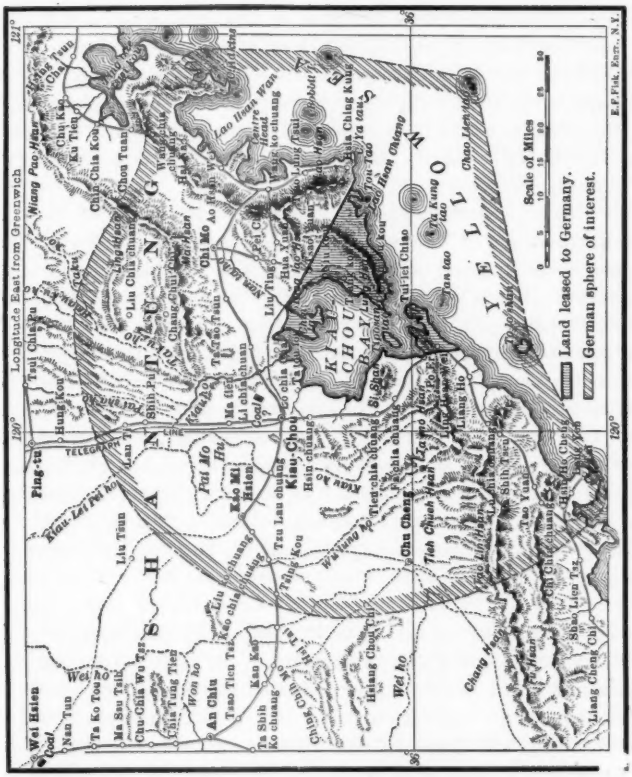
## ASIA.

THE GERMAN LEASE OF KIAU-CHOU BAY.—The accompanying map is based upon a map in *Petermanns Mitteilungen* (No. 2, 1898), from a Japanese map of Shantung. The Japanese map has a large amount of detail, and is also interesting as proof that, long before the recent war with China, Japan began to make preparations for such an event by geographical surveys in China.

The area of the leased territory is 360 square miles, of which 215 square miles are embraced by the waters of the bay. The land area of the sphere of interest is 2,790 square miles. The leased territory, under the terms of the treaty, is entirely subject to the political and legal control of Germany. Within the sphere of interest Germany is at liberty to carry out any enterprises for the commercial and industrial development of the district, including the building of railroads.

The entire coast line of China has only three great gate ways

admitting to the interior. These are the mouths of the Sikiang, Yangtse, and Peiho. The great advantage of Kiau-Chou Bay is that it offers the best means for communication with one of the most densely peopled and richest parts of China by means of minor river routes, fit for a considerable junk traffic, and by railroads yet to be constructed. It affords the best harbor on the coast of north-




east China, and as Prof. Von Richthofen has pointed out in his recent paper on "Kiautschou, seine Weltstellung und Voraussichtliche Bedeutung" (Berlin, Stilke, 1897), it derives additional importance from the fact that all the harbors on the coast of North China are silting up, a process which has been particularly detrimental to commerce at the mouth of the Peiho, on which is Tientsin, whose growth and importance have largely developed within the past ten

XUM

years. For three years, however, this important trade centre has been reached only by light draught coast steamers, to the great detriment of the business of the port. Along the whole coast of the gulf of Pe-Chili there is no other haven which is a gate way to the rich, thickly populated hinterland. Kiau-Chou Bay, on the other hand, is open to the interior and has the additional advantage of being free from ice at all seasons of the year. In the opinion of Prof. Von Richthofen, the coal of Shantung will be the largest article of export; but he does not think there can be a large development of the bay until it is connected with Wei Hsien and Tsi Nan, the capital of Shantung province, by rail, and eventually is pushed further west to form a junction with the great railroad from Pekin to Hankow, now projected. A railroad may be built from the bay westward along the valleys of Lai and Kiau which entirely cross Shantung. When this enterprise is carried out the trade of Chi-fu, on the north coast of Shantung, will be considerably affected, as it cannot so easily open communications with the hinterland.

Herr Otto Anz informs the editor of *Petermanns Mitteilungen* that silk culture is in a most flourishing condition in the central and southwestern parts of the province, and that this large district can supply enough raw silk for a large number of spinning mills. In this way the silk industry of Germany may be made independent of France, Italy, England and Switzerland, from which countries it now derives nearly all its raw silk. Another great industry of Shantung is the manufacture of straw braid for hat-making, in the production of which Shantung, within a few years, has surpassed the more northern province of Pe-Chili, formerly preëminent in this line.

Mr. Cavendish's Travels in Africa.—The *Geographical Journal* for April has a paper by Mr. H. S. H. Cavendish, the young Englishman who started in September, 1896, from Berbera on the Gulf of Aden and led an expedition fitted out at his own expense through Somali Land and around Lake Rudolf. He was the first Englishman to traverse this region, though much of the ground he went over has been visited by Dr. Donaldson Smith and the Italian explorer, Captain Bóttego. He accomplished the main purpose of the journey, which was to see the country to the west of Lake Rudolf, and he made some interesting discoveries. Cavendish found the west side of Lake Rudolf bordered by mountain ranges at a distance of five to thirty miles from the lake, the area between the mountains and the lake being a comparatively level plain covered

in part by thick bush or spear grass, with large intervening spaces that were nothing but sand. He ascended Mount Lubur, the dominating feature and one of the landmarks west of the lake, the top of which, according to his aneroid, is 5,300 feet above the sea. At the top is a crater nearly two miles across, in which are fresh-water springs and a good growth of grass, and here the natives take refuge in time of war with their flocks and herds. To the west, as far as he could see, were great chains of mountains covered with forests. No explorer has ever visited this district, and Cavendish desired to explore in that direction, but the native guides asserted that there was absolutely no water for many days' journey, and so he relinquished the project. In view, however, of the forested condition of the district it is not at all likely that it lacks an ample water supply.

On arriving at the south end of the lake he was surprised to find that Teleki's volcano, the first active volcano discovered in Africa, had entirely disappeared and where it stood was an absolutely flat plain of lava. It was only the year before that Dr. Donaldson Smith had seen Teleki's volcano, and the natives told Cavendish that about six months before his visit Lake Rudolf overflowed, and as the waters poured towards the volcano there was a great explosion after which the water swept in where the crater had been and put out the fire. There is now no sign of the crater in that place, but a field of lava extends to the lake and a new crater has opened about three miles due south, which, when Cavendish saw it, was not over 130 feet high. Perhaps the most interesting report which Cavendish brought home was that coal exists in large quantities near the south-east extremity of Lake Stefanie. The outcrop at the point where he discovered it was several hundred yards square. Major Lugard is of the opinion that if this coal field proves to be commercially valuable it will pay to build a branch of the Mombasa-Uganda Railroad north and use the coal on the railroad and on the steamers of Lake Victoria.

Mr. Cavendish believes that the river flowing into the north end of Lake Rudolf, whose identity has so long been disputed, is no other than the Omo of Captain Cecchi which is in accordance with the views of the late Captain Bóttego, though Donaldson Smith arrived at a different conclusion. The weight of evidence now favors the belief that the Omo sends its waters to Lake Rudolf.

Cavendish had far less trouble with the natives than other travellers in that region encountered. Among the Borani Gallas, where Dr. Smith fought nearly every step of the way, Cavendish says he

XUM

could go from village to village without fear of attack and could get a drink of milk anywhere, for which the natives invariably refused payment. His only serious difficulty was with the Turkana west of Rudolf, and he established friendly relations with them before he left their country.

Completion of the Congo Railroad.—A despatch telegraphed from Stanley Pool announces that the locomotive arrived on March 16 at Dolo, the terminus of the railroad at Stanley Pool. It was in March, 1890, that the first actual work on the railroad around the Lower Congo rapids was begun, and its construction has occupied just eight years. This road, which is 240 miles long, connects about ten thousand miles of navigable waters in the Upper Congo basin with the outer world, and will give to the vast interior of the Congo State commercial advantages that no other part of inner Africa is likely to possess for a long time. It is now generally admitted that Dr. Grenfell's statement is correct, that there is no part of the Congo basin that is more than a hundred miles distant from practicable steam navigation on the rivers; and with the other railroads, now projected, every part of the state, within the next ten or fifteen years, is likely to be placed within comparatively easy reach of Europe by steam communications.—(*Le Mouvement Géographique*, April 3, 1898.)

## THE POLAR REGIONS.

The Belgian Antarctic Expedition.—Dr. Frederick A. Cook of this city, who is a member of the Belgian Antarctic Expedition, wrote from Ushuaia, in the southern part of Tierra del Fuego, on December 27 last, that the *Belgica* was about to sail for the south, following the route of Captain Larsen in a general way, making the greatest southern advance possible during the Antarctic summer, and then turning out of the ice-pack to the sub-Antarctic islands of Prinz Eduard and Kerguelen and thence to Melbourne for the winter. Owing to difficulties with the crew which made it necessary to put five men ashore at Punta Arenas, where other men could not be obtained, the vessel was a little short-handed, and no attempt was likely to be made to land a winter party. If the programme has been carried out, the expedition should be heard from in Australia within a few weeks. The idea was, when Dr. Cook wrote, to recruit the expedition in Melbourne, and before the opening of the second Antarctic winter place a wintering party in Victoria Land and extend the expedition's stay to three years. The ship and the scientific *personnel* are all that need be desired.

SEEKING INFORMATION OF ANDRÉE.—The Swedish Anthropological and Geographical Society has appointed Mr. J. Stadling, who accompanied Dr. Andrée to Spitzbergen in 1896, to make inquiries through Siberia for the purpose of learning if anything is known among the natives there as to the fate of the balloon. He started from Stockholm in April and may be gone till early next year.

GERMAN PLANS FOR ANTARCTIC EXPLORATION.—The German Committee for South Polar research met at Leipzig, on February 19, and formulated a plan for the proposed expedition which is to start in August, 1900, under the leadership of Dr. E. Drygalski. The plan is to reach the South Polar region in the summer of that year, choose a suitable spot for wintering, carry on scientific observations at the station during the winter, and in the spring attempt to advance with sledges over the continuous Polar ice towards the Pole. In the autumn of 1901, it is proposed to follow the coast lines of the southern lands in the direction of the magnetic pole, and, if possible, to explore the west side of Victoria Land, the return being made thence through the pack-ice. The meridian of Kerguelen's Land is recommended for the advance southward, because (1) a serious attempt has never been made on that meridian; (2) its position in regard to the observatories of Melbourne and Mauritius renders it very favorable for magnetic work; (3) by this route the oceanic researches of the *Gazelle* and those of the deep-sea expedition led by Prof. Chun may be extended; (4) and the breaking up of the ice lately observed near Kerguelen's Land promises favorable conditions for the next three years. The *Geographical Journal* says that a complete programme for extended scientific observation covering the entire period spent in the Antarctic regions has been drawn up.

IS THERE AN ANTARCTIC CONTINENT?—At the Royal Society meeting in London, on February 24, to discuss the "Scientific Advantages of an Antarctic Expedition," Dr. John Murray referred briefly to the theory of a large Antarctic Continent, which has received more prominence in his writings than in those of any other authority. He said that the form and structure of the flat-topped icebergs which are the most striking peculiarity of the Antarctic Ocean seem clearly to indicate that they originate on an extended land surface and have been pushed out over low-lying coasts into the sea. As these bergs are floated to the north and melt in warmer latitudes they distribute over the floor of the ocean a great quantity of glaciated rock fragments and land detritus, materials which were

XUM

dredged up by the *Challenger* in considerable quantity, and show that the rocks over which the Antarctic land ice moved were gneisses, granites, mica-schists, quartziferous diorites, etc.

On the other hand, Sir Joseph Hooker said that the ice barrier which Ross traced for 300 miles probably abuts upon land and possibly on an Antarctic Continent; but to prove this was impossible on the occasion of Ross's visit, for he was not able from the crow's-nest of his ship to overlook even the upper surface of the ice. Sir Joseph saw no other method of settling this important point except by using a captive balloon, with which he hoped future expeditions would be provided.

Dr. Nansen laid stress on the importance of exploring the Antarctic land. He doubted whether Dr. Murray's theory of a continuous continent is correct; possibly there are only a number of groups of islands, but there is no doubt that the ice sheets are far more extensive than that of Greenland and the study of them would yield more important results.

## GENERAL NOTES.

METEOROLOGICAL STATIONS IN THE ATLANTIC. — Since 1892, Prince Albert of Monaco has been interesting himself in the planting of meteorological stations on islands in the Atlantic. The first fruits of his work are the establishment of two stations in the Azores, one upon San Miguel, in the east, the other upon Flores about 300 miles west. The station at San Miguel is connected with Europe by cable; that at Flores is 1,200 miles from the continent, and as yet has no cable connection with the outside world, though a cable will probably unite the island with America before long. The combined observations at these two stations will enable the ports of Europe to receive information of threatening weather at sea at least fifty hours before the storms arrive at the coast. When the necessary instruments are provided important information on terrestrial magnetism and seismic movements may also be communicated.—(*Comptes rendus de l'Académie des Sciences,* t. CXXVI.)

TIDE TABLES IN THE GULF OF ST. LAWRENCE.—The Tidal Survey in the Department of Marine and Fisheries, Canada, has published, this year, for the first time, tide tables for Charlottetown, Pictou, and St. Paul Island, C. B., for 1898, with tidal differences for Northumberland Strait, and for the open gulf shore along the north coast of Prince Edward Island. These tables are based upon simultaneous observations of the tides obtained in 1896 and 1897, by means of self-registering tide gauges which were kept in contin-

uous operation at nine places in the south-west part of the Gulf. It has been thus ascertained that the tides in this region can best be deduced from St. Paul Island, which is at the main entrance by which the tides enter the Gulf from the Atlantic.

THE ANTHROPOLOGICAL EXPEDITION TO TORRES STRAIT.—The expedition from Cambridge University, England, to Torres Strait, south of New Guinea, started on March 10, finely equipped for thorough scientific work among the natives. The party is under the leadership of Dr. A. C. Hadden, Professor of Zoology in the Royal College of Science, Dublin, and he has seven assistants, including four medical men, a part of whose work will be the hygienic and medical aspects of anthropology. Dr. Hadden will study the physical characteristics of the natives and their decorative art. Mr. S. H. Ray, the well-known authority on Oceanic languages, will study their language and phonology. A new departure will be made in practical anthropology by Drs. Rivers, MacDougall and Myers, who will study comparative psychology in the field. Special attention will also be given to native music, all the animals and plants utilized by the natives will be identified, various appliances will be employed to test acuity of vision and color blindness, several cameras will be employed, a cinematograph will record native dances and actions, and phonographic cylinders will record the languages and music.—(*The Geog. Jour.*, April, 1898.)

PHYSICAL GEOGRAPHY.—The text-book on Physical Geography which Prof. W. M. Davis, of Harvard University, is now preparing, will be published by Ginn & Co., of Boston. It will lay special stress on the relations between the earth and man in order to show how largely the progress of history, sites for settlement, natural products of rock, soil and water, lines of travel and boundary are dependent upon geographical environment. The book will be illustrated by views from nature and sketches of typical land forms by the author. Such a book is greatly needed to connect the work of the lower grades with that of the college, and even more to give a broad knowledge of geographic forms and processes to the many students who do not reach college.

XUM

## MAP NOTICES.

BY

HENRY GANNETT.

Since the issuance of the last BULLETIN the United States Geological Survey has issued four sheets of the United States Atlas. One of these, Bennington, is in Vermont, and represents a section of the Green Mountains, which here rise high, broad and massive, the greatest altitude upon the sheet being Glastonbury Mountain, 3,764 feet.

In Texas, is one sheet, Uvalde, on a scale of 1:125,000, with a contour interval of 25 feet. The southern two-thirds of this sheet is a low plain, ranging in altitude from 750 to 1,000 feet, broken by numerous little buttes rising 200 or 300 feet above it. The northern third is a broken country, greatly eroded into small details, the relief being evidently made of soft beds, which are rapidly wasting away. The area is drained by Nueces and Frio rivers, which are intermittent streams, not only in time but in space.

In California is one sheet, Karquines, so named from the strait connecting Suisun and San Francisco bays. The scale is 1:62,500, and contour interval 25 feet. The western position of this area is occupied by the Coast ranges, which here barely reach an altitude of 1,500 feet. The eastern portion is occupied by Suisun Bay and by tule marshes.

In Oregon is one sheet, Coos Bay, on a scale of 1:125,000, with a contour interval of 100 feet. This represents a part of the Pacific coast of southern Oregon. It is a region of considerable relief, the Coast ranges rising to altitudes exceeding 1,500 feet. It is drained by Coquille and Coos rivers, both of which are extremely sinuous. The sinuosities of these streams are in part incised and in part are traced in broad flood plains. It is evidently a region which has been base-leveled, and subsequently elevated, and which is now again being depressed, after reaching a mature condition. Coos Bay, and the entrance to Coquille River, are drowned valleys, and the sluggishness of the streams is evidently due not so much to the fact that they have graded themselves, as that they have become graded by the depression of the land.

The United States Geological Survey has recently issued a map of Alaska, with descriptive text, under the title of "The Gold

Fields of Alaska, together with the Principal Steamer Routes and Trails." The base of this map is the Coast Survey map of 1898, on a scale of 1:3,600,000, or about fifty-seven miles to one inch. Upon this base are printed in colors the steamer routes to the principal points on the Alaskan coast and the routes and trails to the interior gold fields. The gold-bearing rocks, so far as known, are indicated by color, and the localities in which gold and coal have been discovered are marked. Upon the same sheet are given, upon enlarged scales, a map of the Klondike gold region and one of the trails over the passes. The map is accompanied by forty-four octavo pages of text, giving a history of the region, description of the routes to the gold fields, the modes of occurrence of the gold and the methods of mining it, and much other useful information.

*Central Alaska, Cook Inlet, Copper River, including Klondike, White, Tanana and Minook Rivers, scale about 30 miles to 1 inch, photo-lith., by J. B. Terrell, 1898, Washington, D. C., and Oakland, Cal.* In this map Mr. Terrell has embodied all the latest information accessible concerning the interior of the central portion of Alaska.

*Military Map of the Island of Cuba, prepared in the War Department, Adjutant General's Office, Military Information Division, 1898. Scale 1:250,000, eight sheets.* Relief is expressed by crayon shading. This is probably by far the most detailed and accurate map of the Island of Cuba which is extant, descending even to such details as by-roads and trails.

A portion of this same map embracing Havana province, has been published upon a larger scale, viz.: 1:125,000, and to it have been added many details not possible upon the smaller scale, such as individual farms, with their character, shops, acequias, ditches, etc.

Of the geological map of Italy, upon a scale of 1:100,000, six additional sheets have been received, and of the special geological map of Alsace-Lorraine, three sheets, upon the scale of 1:125,000, have appeared.

XUM

## BOOK NOTICES.

*The Diplomatic History of America, The First Chapter, 1452–1493–1494. By Henry Harrisse. London, 4 Trafalgar Square, B. F. Stevens, Publisher. 1897.*

Mr. Harrisse begins his work with an examination of the Portuguese claims to the Western World under the Papal grants, from the Bull of Nicholas V, of June 18, 1452, to that issued by Innocent VIII, September 12, 1484. These grants of "countries to be discovered towards the south and eastward, *usque ad Indos*," were held to include the Indies discovered by Columbus in his first voyage; but the three Bulls issued by Alexander VI, May 3 and 4, 1493, in response to the request made by Ferdinand and Isabella, established the Spanish title to all lands west of a meridian one hundred leagues west and south of the Azores and of Cape Verde. A fourth Bull, dated September 25, 1493, extended the field of maritime discovery in favour of Spain (always reserving countries already under the dominion of a Christian prince) in these words, translated by Mr. Harrisse from Navarrete:

> We amplify the donation and extend it with all its clauses to all the islands and main lands whatever, discovered or to be discovered, which in sailing westwards or southwards are or appear in the western, or southern, or eastern parts, and in those of India (p. 66).

The treaty of Tordesillas, signed June 7, 1494, fixed a line of demarcation between the Spanish and the Portuguese jurisdiction at 370 leagues west of the Cape Verde islands; a line which varied, according to the estimated circumference of the earth and the length of the marine league, between the meridians of 42° 30′ and 49° 45′ west from Greenwich.

Mr. Harrisse's fifth chapter is recommended as wholesome reading to those persons in England and America who made haste, two years ago, to join a writer in the London *Times* in denouncing the Papal Bull of Demarcation as *comical* and *ridiculous*.

A map of the eastern part of Brazil, from the mouth of the Amazon to Cape St. Roque, shows the line of division as drawn by different cartographers.

Sixty pages of notes and a full index complete the book, which is well bound and well printed on excellent paper, though disfigured in too many places by careless proof-reading.

On p. 23, for instance, the Bull of Alexander VI is dated *in the*

*year one thousand and ninety-three.* On p. 25 *distet* appears for *distat;* on p. 28 *constituæ* takes the place of *constitutæ.* On p. 157 we read *acquisitisant acquirendis* for *acquisitis aut acquirendis.*

These blunders may be laid at the door of the printer, but some one else is responsible for the whimsical *Amazona,* regularly used as the name of the Amazon, and for the two-headed paragraph on page 23, beginning with the words, *But forasmuch.*

*The Statesman's Year-Book. Statistical and Historical Annual of the States of the World for the Year 1898. Edited by J. Scott Keltie, LL.D., Secretary to the Royal Geographical Society, Honorary Corresponding Member of the Geographical Societies of Paris, Berlin, Lisbon, Amsterdam, Brussels, Buda-Pest, Geneva, Neuchatel, and of the Commercial Geographical Society of Paris, with the Assistance of I. P. A. Renwick, M.A., LL.B. Thirty-fifth Annual Publication. Revised after Official Returns. London: Macmillan and Co., Limited. New York: The Macmillan Company. 1898.*

The Year-Book for 1898 contains, like its immediate predecessor, 1118 pages of surprisingly accurate information. The maps are:

I. Illustrating the Niger Question.
II–V. Showing British Trade and Official Representation throughout the World.
V–X. Diagrams of the Rise and Fall in Imports and Exports for the past Twenty-five Years.

The trade maps do not please the eye. The diagrams are better, but less desirable than well-made tables. The Niger map illustrates, in the words of the editor, the present critical position in that part of the world, where three great Powers have contrived with infinite pains to get in each other's way. What goes on in Africa is repeated elsewhere, and it was an oversight not to show more fully what statesmen are doing for mankind.

*Geographical and Statistical Notes on Mexico. By Matias Romero. G. P. Putnam's Sons, New York and London. The Knickerbocker Press, 1898.*

In this handsome octavo volume the Mexican Minister at Washington has brought together, as he states in his preface, the several articles that he has published from time to time during his many years' residence in the United States, with a view to dispel errors prevailing here about Mexico, and so promote the good-will and increase the commercial, political and social relations between the two countries.

XUM

To these articles he has prefixed a body of statistical information which is not elsewhere to be found in English.

It is hardly to be expected that a work dealing with the details of production, imports and exports, revenues and the like, set forth in tables and columns of figures, shall be always correctly printed; but the table on page 120, entitled, Annual Buildings and Earnings of Mexican Railways, is made unintelligible by the proof-reader's neglect. The three right-hand figures in the first and second columns are decimals, printed without the decimal point. Where the author wrote 2.265 miles, he is made to say 2,265 miles. A similar error occurs on page 195. The total mileage of the Mexican railways was, in 1895, 7,388 miles. According to the message of President Diaz, of April, 1897, there were in operation 45,259 kilometers (28,124 miles) of telegraph lines.

For the fiscal year ending June 30, 1877, the federal revenue of Mexico amounted to $52,108,104.76, and the expenditures for the same year to $48,365,734.04. In 1896–97 the imports amounted to $42,204,095 and the exports to $111,346,494; the United States being entered for rather more than half of the importation and nearly four-fifths of the exportation.

Very interesting are the fifteen pages at the end of the book devoted to the great work now happily accomplished, the drainage of the Valley of Mexico. The canal and the six-mile tunnel through the mountains have a combined length of nearly fifty miles. A map and two sectional cuts illustrate the description.

*Across the Everglades. A Canoe Journey of Exploration. By Hugh L. Willoughby, Ex-Lieutenant Commanding Rhode Island Naval Reserve. Illustrated from Photographs Taken by the Author. Philadelphia, J. B. Lippincott Company, 1898.*

Mr. Willoughby's book adds something to the knowledge of the Everglades, but it is very hard reading. He had three objects in view: The exploration of the southern part of the Everglades; the surveying of a channel through the Ten Thousand Islands, and a reconnaissance of the southwest coast for the confidential charts of the U. S. Naval War College; and the collection of specimens of natural history for the University of Pennsylvania. His success in the second and third may be assumed; the line of the exploration is marked on the map, facing the first chapter, from the Harney River on the west coast in a zigzag direction to Miami on the east coast. The voyage was made in a canoe, in mid-winter, through a country of pure water, always in motion, and the air was

wholesome and full of life. The temperature was between 70° and 80°. One night, however, a norther brought the mercury down to 42°.

The water was nowhere very deep, and progress was slow with the pole, for the paddle is not used in the Everglades. The chief obstacle was the saw-grass, which grows to a height of four feet in thin soil, but sometimes to not less than ten feet. This grass has edges that cut like knives.

Mr. Willoughby and his comrade drank freely of the water at all times. It is a little hard, and much of it comes from the lower rock. Pools, eight or ten feet wide, occur all through the region. Occasionally, in the centre of the pool, there is a dark hole a few inches in diameter. A pole pushed into one of these holes met the water gushing out with force.

Game was plentiful, deer, otters, and many birds, conspicuous among them the white egrets.

Mr. Willoughby cherished the dream of finding an immense snake, but was obliged to put up with the common moccasin and the rattlesnake. He had a good look at a huge crocodile and hoped, with his *favorite shot, to sever the spine just in front of the fore-shoulder;* but the unfeeling brute slid out of the way, and left the hunter to make a list of all known crocodiles in six pages.

The Seminoles appear to be highly desirable persons. They are all, men, women and children, well-made, healthy and handsome, friendly and helpful to each other and to the whites, though, according to Mr. Willoughby, they consider *white man* and *liar* convertible terms. He adds:

> "I may overestimate their moral characteristics, but this I do know, that a Seminole would as soon cut his tongue out as lie. Whenever an Indian has stated something to be a fact, or has passed his word to me that he would do a certain thing, I have always been able to rely upon what he said to the very letter."

With their dove-like innocence the Seminoles combine the wisdom of the serpent in guarding their Eden. If a white man loses his way in the Everglades they will help him out; but they will not lead him in.

Besides the map and the numerous illustrations, the author furnishes an analysis of the Everglade water (p. 167), and a Seminole vocabulary, in which *cherries* and *chewing-gum* are duly entered, with their equivalents.

# ACCESSIONS TO THE LIBRARY.

## MARCH–APRIL, 1898.

BY PURCHASE.

Works by John Croumbie Brown: Forestry in Norway, Edinburgh, 1884, 8vo; Forests and Forestry of Northern Russia, Edinburgh, 1884, 8vo; Finland, Its Forests and Forest Management, Edinburgh, 1883, 8vo; Management of Crown Forests at the Cape of Good Hope, Edinburgh, 1887, 8vo; Water Supply of South Africa, Edinburgh, 1877, 8vo; Forests of England, Edinburgh, 1883, 8vo; French Forest Ordinance of 1669, Edinburgh, 1883, 8vo; Schools of Forestry in Germany, Edinburgh, 1887, 8vo; The Agricultural Pests of India, by Edward Balfour, London, 1887, 8vo; On the Loadstone and Magnetic Bodies and the Great Magnet, the Earth, by William Gilbert, translation by P. Fleury Mottelay, London, 1893, 8vo; Mr. Gladstone and the Nationalities of the United Kingdom, a series of Letters to the "Times," by Sir John Lubbock, et al., London, 1887, 4to; History of the Afghans, translated from the Persian of Neamet Ullah by Bernhard Dorn, London, 1829, 4to; Supplement to Hain's Repertorium Bibliographicum, W. A. Copinger, Part II, Vol. 1, London, 1898, 8vo; Annual American Catalogue and The English Catalogue, 1897, New York, 1898, 8vo; Historia de la Provincia de la Compañia de Jesus del Nuevo Reyno de Granada, etc., etc., El Padre Joseph Cassani, En Madrid, 1741, folio; The Cabot Roll: The Customs Roll of the Port of Bristol, A. D. 1496 to 1499, translated by Edward Scott, introduction by Alfred E. Hudd, Bristol, 1897, folio; A Dictionary of Words used in the East Indies, London, 1804, 12mo; Topographisch-Historischer Atlas von Hellas, H. Kiepert, Berlin, 1846, folio; Atlas Russicus Mappa Vna Generali et Vndeviginti Specialibus, etc., Petropoli, 1745, folio; Nouvel Atlas physique, politique et historique de l'Empire Ottoman, par J. J. Hellert, Paris, 1844, folio; Minerva: Jahrbuch der Gelehrten Welt, 1897–1898, K. Trübner, Strassburg, 1898, 8vo; Life and Resources in America, prepared under the direction of Arinori Mori, Washington, 1871, 12mo; The Moors in Spain, by Stanley Lane-Poole, London, 1890, 8vo; Walks in Algeria, by L. G. Séguin, London, 1888, 8vo; Sand and Canvas: Adventures in Egypt, by Samuel Bevan, London, 1849, 8vo; Life in Sweden, by Selina Bunbury, London, 1853, 2 vols., 8vo; Sixteen Months in the Danish Isles, by Andrew Hamilton, London, 1852, 2 vols., 8vo; Christopher Columbus, his Life and his Work, by Charles Kendall Adams, London, 1892, 8vo; Hindostan, its Landscapes, etc., the Shores of the Red Sea and the Himalaya Mountains, a Series of Views, with Descriptions, by Emma Roberts, London (1845), 4to; The Orkneys and Shetland, by John R. Tudor, London, 1883, 8vo; South Africa of To-day, by Francis Younghusband, London, 1898, 8vo; Cabot's Discovery of North America, by G. E. Weare, London, 1897, 8vo; Description Géographique de la Guyane, par (Nicolas) Bellin, Paris, 1763, 4to; The Jesuit Relations and Allied Documents, edited by Reuben Gold Thwaites, Vols. XV, XVI, XVII, XVIII, Cleveland, 1898, 8vo; Across the Everglades, by Hugh L. Willoughby, Philadelphia, 1898, 16mo; Eastern Journeys, by Charles A. Dana, New York, 1898, 16mo; Annual Literary Index, 1897, W. I. Fletcher and R. R. Bowker, New York, 1898, 8vo; A History of the English Settlements in India, by J. Talboys Wheeler, London, 1878, 8vo; A History of the Sandwich Islands Mission, by Rufus

Anderson, Boston, 1870, 16mo; A Short History of Barbados, from its First Discovery, etc. (George Frere), London, 1768, 8vo; Ricerche Istorico-Critiche circa alle scoperte d'Amerigo Vespucci, ecc., Compilate da Francesco Bartolozzi, Firenze, 1789, square 8vo; Relation du Voyage du Port Royal de l'Acadie, par M. Diereville, Amsterdam, 1710, 12mo; The Red Man and the White Man in North America, by George E. Ellis, Boston, 1882, 8vo; Geschichte des Seefahrers Ritter Martin Behaim, von F. W. Ghillany, Nürnberg, 1853, 4to; The Missions of California, by Laura Bride Powers, San Francisco, 1897, 16mo; Who's Who?, 1898, edited by Douglas Sladen, London, 1898, 8vo; Whitaker's Almanack, 1898, London, 1898, 8vo; American Biography, by Jeremy Belknap, Boston, 1794, 1798, 2 vols., 8vo; A General Biographical Dictionary, by J. L. Blake, New York, 1835, 8vo; The Dawn of Modern Geography, by C. Raymond Beazley, London, 1897, 8vo; A Journey in Carniola, Italy and France, by W. A. Cadell, Edinburgh, 1820, 2 vols., 8vo; A Voyage to Cadiz and Gibraltar, by Lt.-Gen. Cockburn, London, 1815, 2 vols., 8vo; A Glance at the Interior of China, (Shanghae), 1845, 8vo; Recollections of a Visit to the United States, by Robert Playfair, Edinburgh, 1856, 8vo; A Trip to Mexico, by A Barrister (—— Forbes), London, 1851, 8vo; Records of Longevity, by Thomas Bailey, London, 1857, 8vo; Voyages dans l'Intérieur de l'Amérique Méridionale, par Julien Mellet, Paris, 1824, (2nd Edition), 8vo; History of New Hampshire, by Jeremy Belknap, Dover, 1812, 3 vols., 8vo; The Isle of Wight, by Sir H. C. Englefield, London, 1816, 4to; Works by Albanis Beaumont: Travels through the Rhaetian Alps, London, 1792, folio; Travels through the Lepontine Alps, London, 1800, folio; Travels through the Maritime Alps, London, 1795, folio; Irish Celts, (by James O'Brien), Detroit, 1884, 8vo; The Red Mountain of Alaska, by Willis Boyd Allen, Boston, (1889), 8vo; Memorials of a Half-Century in Michigan and the Lake Region, by Bela Hubbard, New York, 1888, 8vo; A Survay of London written in 1598 by John Stow, edited by Henry Morley, London, 1890, 8vo; The Gold Regions of South Eastern Africa, by Thomas Baines, London, 1877, 8vo; The National Gazetteer, by L. de Colange, New York, 1884, 8vo; The Diplomatic History of America, 1452–1493–1494, by Henry Harrisse, London, 1897, 8vo; Periplus, an Essay on the Early History of Charts and Sailing Directions, by A. E. Nordenskiöld, Stockholm, 1897, folio; Voyage Pittoresque et Historique de l'Istrie et de la Dalmatie, par Joseph Lavallée, Paris, An X–1802, folio; The Origin of Primitive Superstitions, by Rushton M. Dorman, Philadelphia, 1881, 8vo; Greece, Pictorial, Descriptive and Historical, by Christopher Wordsworth, London, 1839, 8vo; Illustrated Itinerary of Cornwall, (Cyrus Redding), London, 1842, 8vo; Journal of a Voyage in 1811 and 1812, to Madras and China, etc., by James Wathen, London, 1814, 4to; A Trip to Cuba, by Julia Ward Howe, Boston, 1860, 16mo; The Gypsies, by Charles G. Leland, Boston, 1882, 16mo; The White Hills, etc., by Thomas Starr King, Boston, 1860, 8vo; L'Amérique: Anthologie Géographique, par L. Didier, Paris, 1898, 12mo; Die Seehäfen des Weltverkehrs, von Alexander Dorn, Wien, 1891, 2 vols., 8vo; The Century Atlas of the World, Benjamin E. Smith, Editor, New York, (1897), 4to; Recueil de Voyages et de Mémoires, (Société de Géographie, Paris), Tome VII, Paris, 1864, 4to; A Letter written on October 4, 1589, by Captain Cuellar, of the Spanish Armada, to Philip II, etc., translated by H. D. Sedgwick, Jr., New York, 1895, 16mo; Vues des Cordillères, et Monumens des Peuples Indigènes de l'Amérique, par Al. de Humboldt, Paris, (1816), 2 tomes, 8vo; The Statesman's Year Book, 1898, edited by J. Scott Keltie and I. P. A. Renwick, London, 1898, 8vo; Dictionary of National Biography, edited by Sidney Lee, Vol. LIV, London, 1898, 8vo; Incwadi Yami, or Twenty Years' Personal Experience in South Africa, by J. W. Matthews, London, 1887, 8vo; L'Algérie et la Tunisie, par

XUM

Paul Leroy-Beaulieu, 2e Édition, Paris, 1897, 8vo; La Corée, Indépendante, Russe ou Japonaise, par Villetard de Laguérie, Paris, 1898, 16mo; Memoirs of Baron de Tott, containing the State of the Turkish Empire and the Crimea, etc., London, 1785, 2 vols., 8vo; Journal of a Tour and Residence in Great Britain, by Louis Simond, Edinburgh, 1817, 2 vols., 8vo; In the Track of the Sun, by Frederick Diodati Thompson, New York, 1893, 4to; Gibraltar, by Henry M. Field, New York, 1888, 8vo; New England's Memorial, by Nathaniel Morton, Plymouth, Mass., 1826, 12mo (reprint); A Popular History of the Discovery of America, by J. G. Kohl, translated from the German by R. R. Noel, London, 1865, 8vo; The First Republic in America, by Alexander Brown, Boston and New York, 1898, 8vo; Geographisches Jahrbuch, Band XX, 2te Hälfte, Gotha, 1898, 8vo; Fridtjof Nansen, von Eugen von Enzberg, Dresden, 1898, 8vo.

GIFTS.

*From Albert Perry Brigham, Author:* .

Topography and Glacial Deposits of Mohawk Valley. (Bulletin of the Geological Society of America, February, 1898), Rochester, pr., 8vo.

*From Samuel Edward Dawson, Lit. D. (Laval), Author:*

The Voyages of the Cabots: Latest Phases of the Controversy. (Extract), Ottawa, 1897, pr., 8vo.

*From W. Bell Dawson:*

Tide Tables for Charlottetown, Pictou and St. Paul Island, C. B., for 1898, Dept. of Marine & Fisheries, Ottawa, 1898, pr., 8vo; Character and Progress of the Tides in Gulf and River St. Lawrence, by W. Bell Dawson. (Reprint from Transactions Royal Society of Canada), 1897, pr., 8vo.

*From Jules Leclercq, Author:*

Un Séjour dans l'Ile de Java, Paris, 1898, 18mo.

*From the Verein für Volkskunde in Lemberg, (Austria):*

Lud (Das Volk) Tom IV.—No 1.

*From the Ministerio da Marinha e Ultramar, Commissão de Cartographia, Lisbon:*

Eleven Maps:—Reconhecimento Hydrographico do Rio Limpopo, desde a sua fóz até á confluencia do Chengane, 1897; Plano do Porto e Cidade de Dilly, 2a Edição, 1895; Provincia da Guiné, Communicação entre o Rio Tombali e o Cacine, 1897; Provincia da Guiné, Esboço do Rio Corubal, entré o Rio Geba e Porto Ugui, 1897; Reconhecimento do Rio Geba, desde a fóz do Corubal até Geba, 1897; Provincia da Guiné, Reconhecimento do Rio Cacheu, 1897; Provincia da Guiné, Reconhecimento do Rio Mansôa, desde a sua fóz até ao Impernal, 1897; Provincia da Guiné, Reconhecimento do Canal do Impernal e Rio Mansôa, desde a fóz do Impernal até Porto Mansôa, 1897; Provincia de Moçambique, Reconhecimento hydrographico da Barra e Porto de Angoche, 1897; Africa Oriental Portugueza, folha No 4, Zumbo-Tete, 1897; folha No 8, Quelimane-Sofala, 1896.

*From the Mexican Minister at Washington, Author:*

Geographical and Statistical Notes on Mexico, by Matias Romero, New York and London, 1898, 8vo.

*From S. A. S. le Prince Albert 1er de Monaco, Author:*

Sur la Quatrième Campagne Scientifique de la "Princesse Alice," (Extrait); Sur les Observations Météorologiques de l'Océan Atlantique, (Extrait), (Paris), 1898, pr., 4to.

*From F. H. Newell:*

Supplement to Directory of Scientific Societies of Washington for 1897, corrected and brought down to 1898. Prepared by the Joint Commission, Washington, 1898, pr., 8vo.

*From Prof. Dr. Eugen Oberhummer, Munich, President:*

Bericht der Central Kommission für Wissenschaftliche Landskunde von Deutschland, von Ostern 1895 bis Ostern 1897. Berlin, 1897, pr., 8vo.

*From E. L. Plumb:*

Naval Station in the West Indies, Report, March 31, 1898. (55th Congress, 2d. Session, Report No. 816, Senate.)

*From J. de Rey-Pailhade, Author:*

Sur l'extension du système décimal au jour et au cercle entiers: avantages et procédés pratiques, (Paris), 1898, pr., 4to.

*From Henri de Sarrauton, Author:*

Sur le Système de l'heure décimale, les divisions du jour et du cercle, et la Table géographique. (Paris), 1898, pr., 4to.

*From Paul Eve Stevenson, Author:*

A Deep Water Voyage, Philadelphia, 1898, 16mo.

*From the Svenska Turistföreningen, Stockholm:*

Ärsskrift för är 1898; Cirkulär, 1898, Nr. 17.

*From the War Department, Washington, D. C.:*

Military Map of the Island of Cuba, prepared in the War Department, Adjutant General's Office, Military Information Division. From the Latest Official Sources, 1898. Scale: 1-250,000. Eight sheets. Havana Province, Cuba. Adjutant General's Office, M. I. D. 1898. Scale: 1-125,000. 1 sheet.

## NOTES AND NEWS.

Two announcements, received too late for insertion in BULLETIN No. 1, must be noticed:

The *Geographische Gesellschaft*, Hamburg, sent an invitation to attend the celebration of its Twenty-fifth Anniversary on the 17th of March. The programme included a general meeting in the forenoon and a dinner in the evening.

On the 16th of April the *Société de Géographie et d'Archéologie*, of Oran, Algeria, the fifth in order of time on the long roll of French geographical societies, was to celebrate its Twentieth Anniversary.

The Arctic Club of America desires to extend the privilege of membership to all throughout the world who are interested in Arctic and Antarctic exploration.

No initiation fee is asked, and the annual due of $1 from each member covers necessary mailing expenses and the cost of the annual catalogue, which will be sent to all. This catalogue gives details of biography and history.

Communications should be addressed to the Secretary,

ALBERT OPERTI,
151 West 35th St.,
New York City.

The *Verein für Siebenbürgische Landeskunde*, of Hermannstadt, will hold a meeting on the 22d of August, 1898, at Kronstadt, to celebrate its 50th Anniversary. The city of Kronstadt will dedicate at the same time a memorial statue to the Reformer Johannes Honterus.

The *Verein* extends a cordial invitation to all sister societies to participate in the festivities of this double celebration.

An *Esposizione Generale Italiana* will be held in Turin in the months April–October, 1898.

The classification embraces Ten Divisions:

I.—Fine Arts.
II.—Liberal Arts.
III.—Public Economy and Hygiene.
IV.—Chemical Industries.
V.—Mechanical Industries.

VI.—Electricity (International).
VII.—Manufacturing Industries.
VIII.—Agricultural Industries.
IX.—Italian Explorations, Emigration and Colonies, Commerce and Navigation.
X.—Physical Education and Sport.

There will also be an Exposition of Sacred Art, Ancient and Modern.

The programme of the Ninth Division, First Section, includes a Review of Italian Explorations from the Roman Expansion to the year 1888; the Explorations of the period 1888–1898; Private Expeditions; Expeditions under Government auspices; Cartography; Studies of the Land; Water; Climate; The Flora and the Fauna; Ethnography and Linguistics.

The Roumanian Geographical Society has just published the first Fasciculus of the great Geographical Dictionary of Roumania, under the direction of its Secretary, George John Lahovari, Gen. C. I. Bratianu and Prof. Gregory G. Tocilescu.

The Dictionary is in quarto form, three columns to the page, and the present fasciculus contains 160 pages, beginning with the word *Aaron-Vodă* and closing with *Bacău*.

Paper and printing are excellent.

The *Société de Géographie et d'Archéologie d'Oran* issued this year in place of its first Quarterly Bulletin a Special Bulletin to commemorate the 20th Anniversary of the Society, which occurred April 16th, 1898.

Among the papers in this number are: *Le Nivellement général de la France, par Charles Lallemand; Deux Inscriptions relatives à des Généraux Pompéiens, par Héron de Villefosse; Un Portrait de Juba II, par P. Gaukler; Carthage—Découvertes de Tombes Puniques, par A.-L. Delattre;* résumés of the Society's past work, and a vigorous affirmation, by Emile Gautier, of what has been done in Algeria.

Mr. Peary's book, *Northward Over the Ice*, will be published May 21 by the Frederick A. Stokes Company.

XUM

## TRANSACTIONS OF THE SOCIETY.

### MARCH–APRIL, 1898.

A Regular Meeting of the Society was held at Chickering Hall on Monday, March 14, at 8.30 o'clock P.M.

President Daly in the chair.

The following persons, recommended by the Council, were elected Fellows:

Hartwell A. Wilkins.
Charles J. Barnes, Chicago.
J. W. Hoffman, Orangeburg, S. C.
John S. Phillips.
Charles Batchelor.
Mrs. James Herman Aldrich.

The President then introduced to the Society Dr. Titus Munson Coan, who made an address on The Hawaiian Islands: the Country and the People.

On motion, the Society adjourned.

A Regular Meeting was held at Chickering Hall on Monday, April 11, at 8.30 o'clock P.M.

President Daly in the chair.

The following persons, recommended by the Council, were elected Fellows of the Society:

J. Burke Wolfe.
M. D. Howell.

The President called the attention of the Society to the invitation received in March from the Syndic and Municipality of Florence to the Celebration to be held in that city, April 17–27, in commemoration of Paolo Dal Pozzo Toscanelli and Amerigo Vespucci, two famous Florentines whose names are associated with the history of the discovery of the New World.

In response to this invitation the Council appointed as Delegate to the Toscanelli-Vespucci celebration Captain Alfred T. Mahan, U. S. N., retired.

A letter from the Department of State, under date of March 18, expressed the desire of H. E. the President to nominate, as Honorary Representative of the United States at the Celebration, the delegate selected by this Society.

This offer was thankfully accepted on the 23d of March, and Captain Mahan departed on his mission by the steamer *Fulda*, on the 28th of March.

President Daly introduced Signor Branchi, Consul-General for

Italy, who spoke briefly of the coming festivities in Florence and their significance for Americans as well as for Italians.

Portraits of Toscanelli, Vespucci, and Columbus were thrown upon the screen.

The President then introduced Mr. Clarence Pullen, who addressed the Society on the Mingling of the Races in Aztlan, and showed a number of views in illustration of his subject.

On motion, the Society adjourned.

---

The interest in Arctic exploration takes various forms.

A plan for reaching the North Pole by a railway was submitted to the Council of this Society in January last.

The starting point was to be in Grant Land, "as far as one can come without being hindered by ice."

Things needed were these:

1. A steamer to reach the starting point.
2. Tracks.
3. Engine, with 10 cars.
4. One sleeping-car.
5. One car with provisions.
6. Coal and wood.

The party to consist of the inventor, one machinist and six workmen.

The tracks were to be laid, almost without effort, in this manner:

"In all cases a smooth surface must be obtained by blowing up any pack-ice that the tracks can be laid. These are made ready for laying, and *are extra prepared for that purpose.* Each track is 20 feet long and 1½ x 1½ inch thick; the weight of each track amounts to 40 lb. They can easily be fastened by a bolt one to another, are connected by three iron cross-sticks and held fast in the ice by two bolts on each side. So 3–4 miles can be laid every day. The expenses for each track of 20 feet will amount to $4.00, and as now 1,000 miles are to be laid and every mile costs $1,000.00, the total sum for all tracks being needed will amount to $1,000,000.00."

The engine to be of 100 horse power, and provided with a tank on each side for water.

While laying the tracks the party would always have the engine and one car at hand, with all things needful, including a light, "that we can see at our work during the long nights."

The cost of this simple solution of an old problem is estimated at $1,500,000, including wages and the "necessary amount of wood."

XUM